Electrical World

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The President on Service and Reward

PRESIDENT WILSON'S talk to the American Electric Railway Association last week is heartening to all fair-minded public utility operators. Addressed directly to public utility managers, it is also a reassurance to "big business." Outside of the prediction of prosperity, the remarks carry weight because they were made to an industry that has been specially beset. The "rules of the game," as seen by the President, are general rather than specific, but if fundamental policies are right, details are apt so to be. First is publicity. For years people within the industry have recommended publicity as the infallible cure; from without the industry an unprejudiced detached observer now warns all who still hold to secrecy. The Executive puts second a full equivalent in service for money received. The fair corollary to this is, of course, that the public shall give full equivalent in money for service received. The third rule is conscience, the knowledge that so far as we get money from it "we are employees of the public." To exactly the same degree is the public the employer of companies. If employee must have conscience, so must employer. Fourth, the "spirit of service" is "to see to it that the thing that you do for the public and get money for is the best thing of that kind that can be done." These are not idle words. They are part of the sound and wholesome doctrine of service and reward.

For a National Electrical Week

THE proposal for a national electrical sales and educational week finds instant and willing support. The encouraging responses are a promise of that cooperation which alone can make a campaign electrical week successful. The bare outline of the plan discussed at the meeting called by the Society for Electrical Development, as published in our issue of Jan. 16, preliminary and tentative though it is, has aroused widespread approval. Letters from central-station representatives, manufacturers, jobbers and contractors, published in the ELECTRICAL WORLD, uphold the movement. Since the industry heartily indorses the general plan, the essential step is to determine what real work is necessary to carry it forward triumphantly. If the achievements of the "national electrical week" are to be creditable no time can be wasted. Before all branches of the industry can be vivified to do their part it is necessary to decide upon details concerning which fair differences of judgment will arise. All are not of one mind as to the best date. The week of Oct. 18 was selected after thorough discussion because the already celebrated "Edison Day" falls in that week; a time in the autumn was preferred because that season is best adapted to lighting effects. These reasons appear to be sound and conclusive, but if the reasons advanced for another time are better they should control. The public will like a date in mild weather when evening walks on brilliantly lighted city streets permit enjoyment of the air and the "sights."

Rate Schedules in New York

THE order of the New York Public Service Commission, Second District, requires all plants, municipal and corporate, large or small, to file schedules of rates uniform as to method of compilation. The plan is based upon the report of the committee on gas and electric schedules, presented to the commission two years ago, although the recommendations have been modified a little by the commission. Substantial uniformity is assured by the arrangement of the Empire State Gas & Electric Association to send blank forms to each company and municipality concerned. These will accord with the wishes of the commission, and the rates will be printed therein by typewriter or similar method. This is co-operation that not only saves money but also assures prompt compliance by officials of small plants whose unfamiliarity with schedules would lead to unintentional disobedience. The practice of up-State companies will differ from that of Greater New York companies, which file exact copies of contracts with the First District commission. If it is to be the universal practice of commissions to order the filing of rate schedules in uniform form, co-operation will mean substantial saving.

Water-Power Rights and the Rich

MANY signs of a better attitude toward corporations brighten the outlook. There is more plain speech from public men. This attitude was well shown in a minority report of Mr. Patrick E. McCabe, member of the New York Conservation Commission. "Think of having something to sell," he says; "you won't sell it to a rich man and a poor man can't buy it." This commissioner, a practical man facing the facts, also says that "there is an element of politics in all public questions in this country. . . . which makes it impossible for this country to compete in a commercial enterprise with private corporations." The simple remedy proposed by Mr. McCabe is a bill providing for the highest private development of the State waterpowers with commensurate return to the people. This businesslike solution is precisely the one that is not favored by many of the modern conservationists for the people. The Executive of the country, in ideal

language, urged "use with conservation." The trouble with the recent policy of New York State on water-powers is that it has rigidly stood for conservation on such terms that "use" was impossible. Consequently the energy that could have been generated is irrecoverable.

The Integrating Sphere and Arc-Lamp Photometry

In the early days of incandescent lighting lamps were so nearly uniform in type and performance that their mean horizontal candle-power was a sufficient and satisfactory criterion of comparison. It was known that the mean spherical candle-power of a lamp was the only true basis of comparison between light sources in regard to the output of light, but the differences between the various types of lamps available were not sufficiently great to make refinement on mean horizontal candle-power necessary. More recently, however, the types of electric lamp have increased in numbers and in differences of light distribution to such an extent as to render necessary the recognition of mean spherical candle-power, or, what is equivalent thereto, the total emitted flux in lumens. There are two methods of measuring the total lumens of light given out by a lamp. One is to measure the distribution of mean candle-power in a number of successive zones above and below the horizon, following this up with a suitable integration process. The other is to employ a photometric device for measuring mean spherical candle-power directly. The latter method has great advantages in swiftness and in simplicity, provided that only the total luminous flux is wanted. The former method may be preferable when the distribution of light, as well as the total quantity, is required to be known.

A well-known device for measuring spherical candle-power directly is the Ulbricht integrating sphere. It is a hollow sphere of suitable size, carefully coated on the inside with dull diffusing white. The lamp to be photometered is supported inside in such a manner that the light emitted is scattered to and fro in all directions, thus raising the illumination of the inner wall to a considerably higher value than would be obtained by direct illumination unaided by diffuse reflection. A little window of milk glass is cut into the wall at some convenient point, and the illumination on this window is measured photometrically. It should be directly proportional to the mean spherical candle-power of the lamp inside the sphere.

If the dull white paint on the inside of the globe could be made sufficiently non-absorbing, the Ulbricht sphere would be theoretically nearly perfect, but the best paints absorb about 20 per cent of the light at each incidence, and this gives rise to certain errors which under special conditions may become serious. Thus the test window has to be protected from the direct light of the lamp inside the sphere lest this direct illumination should influence the total too greatly. A screen has, therefore, to be supported inside the sphere between the lamp and the test window. But this screen has the effect of cutting down the illumination on the test window too much. The amount of the error is very difficult to compute and is best determined by experimental methods. Some photometrists claim that opaque screens are preferable to the translucent screens very generally employed in this country. This is, however, a matter of degree in precision which depends upon a number of factors. It seems likely that under one set of conditions better results would be obtained with an opaque screen and under other conditions with a translucent screen. The greater the diameter of the sphere the less it matters whether the internal small screen is translucent or opaque. The question of cost enters largely into the construction of large Ulbricht spheres. The spherical shape is always expensive. It remains to be seen whether the octahedron or one of the regular solids with yet more numerous faces might not be used in place of a sphere, with almost as good photometric results and with manifest advantages in construction, assembling and cleaning.

Distribution Costs in a Small Plant

A brief article in the current issue contains a very instructive report on the analysis of the operating expenses in Manhattan, Kan., a town of some 7800 people. Like many small places, there is an exceptionally large proportion of residence customers. The amount of business lighting is not great and the motor service is not large. In making the analysis the total costs were apportioned to the several classes of customers in the following way: A certain part is proportional to the number of meters, another to the investment, and a third is made up of some special items which belong only to a particular class of consumer. Without going too far into the details of the investigation, it appears that, including everything but the cost of energy, the cost of residence lighting reached 8.95 cents per kw-hr., the business lighting 5.15 cents, street lighting 2.45 cents, and motor service 0.221 cent.

The prices actually paid by these various classes of consumers are not here of record, but it is safe to say that none of them is served at a loss. It would be rather interesting to know the relative total profits paid by the several classes of customers, adding in the cost of energy. It is very clear that the residence customers should pay, as they probably do, a liberal price for their accommodation, and yet in estimating the cost of serving them one is too apt to forget that they furnish in the aggregate a large amount of business. In fact, it is an open question whether this particular concern could stay in business if it lost its residence customers, expensive as they apparently are, or, to put the matter in another way, if it had never acquired them it probably would never have succeeded. It is instructive to analyze somewhat the distributing costs here considered. Those due to metering, accounting and charges against meters in service rise to about 60 cents per meter per month. It seems to us that the question here raised is not whether the small lighting consumer really pays as a customer, but how to make him pay by reducing the meter charge. There is no question whatever

that for very small consumers the distribution costs are a heavy burden on the company, and one instinctively asks whether in a small place like this some form of contract system, such as is used in Hartford, Conn., and other places, plus the simplest possible methods of accounting and billing, might not in the long run reduce considerably the cost of handling the very small loads. In Hartford at last reports about 125,000 lamps were out on contract, the contract being arranged so that the larger residence consumers find it better to buy energy on the metered basis. Thus the logical merits of metering are not neglected.

Off-Peak Schedules and the Garage Owner

This is the time of year when the electric-garage owner who is purchasing central-station energy on an off-peak schedule may find occasion to blaspheme the company management in general for instituting such a rate, and himself in particular for becoming a party to an agreement which, he feels, penalizes him for service taken at a time when he needs it most. Consider a typical case. A big truck draws up at the garage about 4 o'clock on a winter's afternoon, and the driver calls for a boosting charge which will enable him to complete an unexpected special trip. But the clock shows that the hours of the "peak" are at hand, and to furnish the ponderous wayfarer with the electric refreshment it requires means to the garage owner a tax of a dollar (or often $12 per year) for every kilowatt of demand during those inhibited peak hours, however short the period of the boost or however few the kilowatt-hours actually consumed. The driver, therefore, must prepare to stand by while the truck waits until the passing of the peak at 8 or 8:30 o'clock. Deliveries are, as the result, delayed four hours or more, and it is long after midnight when the driver finishes his task. If the garage owner expresses dissatisfaction with the off-peak system after such an experience, it is, in contrast, likely to be mild indeed compared with the observations of the driver and the owner of the truck so tied up.

A similar difficulty confronts the owner of the electric passenger car who has been shopping or calling all day and at 5 o'clock wants a freshening boost put in the batteries for an evening trip to the theater or to a social gathering across town. Again it is the hour of "the peak." Too often the innocent victim of such a non-humorous hoax is allowed to go his way with a new and limited conception of the usefulness of the electric car when charged under a peak-load form of contract. The guilt is the garage man's for leaving this impression, but part of the blame must also rest on the shoulders of the central station if its agents do not take the pains to explain to the garage men how to avoid turning customers away with batteries unreplenished. First, the garage man should be taught to contract for a certain limited amount of service continuously throughout the peak. The quantity should be sufficient to furnish emergency boosts to any car or truck likely to visit the garage. Probably the garage owner already pays for a few kilowatts of lighting load on such an unrestricted basis, and it is not likely that he objects to the use of the lamps during a winter's afternoon. Taken on the yearly basis, the total increased cost of contracting for a small fraction of the garage's demand at the unrestricted, wholesale rate will amount to a very slight difference in the unit cost of energy. Especially will the difference be slight if care be taken to utilize the small peak demand to the fullest extent during all twenty-hours of the day. In this way, by distributing the charging of cars so as to load the small demand to its full extent, a low equivalent rate will be earned on this energy by utilizing the demand element of the rate to its limit, while at the same time the total demand needed will be accordingly decreased. With such arrangement the occasional car may be charged by the garage at any time, and the slight difference in annual cost to the garage owner, if any, will be offset by his gain through the increased satisfaction and convenience of his customers.

The Rating of Incandescent Lamps

An article by Mr. H. Armagnat, noted in the Digest in this issue, contains a considerable amount of useful information regarding the distribution of light from various kinds of incandescent lamps, with respect both to the horizontal rating and to the mean hemispherical candle-power attained. For the older types of lamps such data are very familiar and well known, but for the new metallic-filament lamps with their great variety in the arrangement and working of the filament the facts ascertained from actual measurement have been rather scarce. In particular, the photometry of these recent lamps, as has been shown by more than one investigator recently, is most troublesome and unsatisfactory. For a comparatively simple form of lamp thoroughly standardized and extensively investigated there has been substituted a great group of more or less experimental forms, changing with kaleidoscopic rapidity and giving all kinds of trouble to the photometrist who has gained his experience along strictly conventional lines.

The author appears not to be familiar with the sphere photometer, or gravely underestimates its convenience. In the present state of things there is only one logical method for rating incandescent lamps, and that is upon their total light flux in mean spherical candles or, preferably, lumens, which rating can be ascertained quickly and accurately by a single measurement in the sphere photometer. In the early days of electric lighting when lamps were hung up in any way which seemed convenient, with only the slightest attention to reflectors, the distribution of light around the axis and in the vertical plane was a matter of some consequence. At present, when no intelligent person thinks of using lamps without suitable shades or reflectors, the total light flux is the only feature to be given serious consideration, and the sooner the mean horizontal ratings for incandescent lamps follow into oblivion the hypothetical "2000 cp" of the old arc lamps the better it will be for the science of illumination.

LETTERS TO THE EDITOR

Concentric Wiring

To the Editor of the ELECTRICAL WORLD:

SIR:—The present attitude of a few of the manufacturers and jobbers toward the introduction of concentric wiring would be amusing were it not that it threatens to delay the introduction of what all who have given the subject a little consideration agree will result in increased business and profit not only to the central stations but, with very few exceptions, to the manufacturers, jobbers and contractors as well.

That much of the opposition is due to the efforts of a comparatively small part of the interests who think they are threatened is well known, and it is to be hoped that better counsels will prevail before the next meeting of the Underwriters' committee, to the end that tentative approval, at least, be given to the use of the new system.

The introduction of the system is inevitable unless a combination in restraint of trade be formed that will resist public opinion and law as well, and certainly no one believes the Underwriters will become a party to any such combination.

It is to be hoped, however, that sufficient time will be allowed for the development of the conductors and fittings so that when the system is ready for general use all devices will have been standardized so far as possible.

There is no reason why all conductors having a uniform carrying capacity should not have a uniform outside diameter, no matter who makes them. All fittings should conform to such diameter, and obviously all such fittings should be of the so-called polarity type. There are other features that should be settled before the system is thrown open to general use. In so far as possible the system should be standardized, and I believe that everyone will agree that the question of standards should be determined by a joint committee made up of representatives of the Underwriters, the National Electric Light Association and the manufacturers, rather than by the latter alone. Certainly we must avoid the totally unnecessary confusion that exists at present in separable attachments plugs and receptacles.

The introduction of the concentric-wiring system promises to do as much for the extension of electric service as has the tungsten lamp. It is now time to start, but let us start right.

H. A. FEE,
President Michigan Section, N. E. L. A.

Adrian, Mich.

Cheap Electric Wiring

To the Editor of the ELECTRICAL WORLD:

SIR:—From time to time there have appeared articles in the electrical press in which the American system of wiring is compared with that of Europe, and the latter system is frequently favored on account of its cheapness. While one cannot deny the fact that cheapness is the fundamental basis of modern commercial development, yet we should not ignore the fact that a good many other considerations must be carefully taken into account before we can adopt European methods of wiring and be reasonably certain of obtaining an improvement. At present we have a system superior to those of Europe which has been gradually developed in this country in accordance with our needs and the nature of our buildings. The latter are more subject to fire risk than those abroad. The fact that we have not adopted any other system is not to be attributed to our ignorance, but to other causes.

The steel industry was originated in England, but Americans were not slow to conceive methods which enabled them to make rails cheaper and better and to supply the English people with a product as good as their own at a lower cost. Our electrical industry may not yet have reached that point, but it is certainly traveling in that direction. We are not only compelled to be up to date in our manufacturing methods and produce the best we can, but we are severely driven by heavy competition to reduce the cost of our product. We are striving so to equip ourselves as to meet the requirements of low cost which dominates so strongly our present tendencies in manufacturing. It seems best, therefore, to be content with this logical evolution of industry and permit an actual desire for improvement and the keen competition to develop a wiring system that exactly suits our conditions, that give us better protection from fire and other damages, that represents the typical American products. We should not discard our present excellent system in favor of something that has been developed under radically different conditions for satisfying different needs. Are we not liable to be the losers in the end?

WILLIAM HANDLEY,
General Manager Tubular Woven Fabric Company.

Pawtucket, R. I.

Lighting of Country Roads

To the Editor of the ELECTRICAL WORLD:

SIR:—In connection with the editorial on the "Lighting of Country Roads" in your issue of Dec. 26, containing the statement that "even 40-watt or 50-watt lamps spaced twenty to the mile are a great deal better than nothing," the older operators of lighting properties will recall several towns and villages of 5000 and 6000 inhabitants that up to a few years ago were lighted by the Thompson-Houston system series incandescent carbon lamps of 25 alleged cp, placed at the intersection of the streets, usually about 400 ft. or 500 ft. apart. When the street lamps failed, as was frequently the case in those days, quite a difference was noted in the community, I assure you.

Modern 40-watt lamps series lamps giving about 36 cp, placed twenty to the mile, or 264 ft. apart, would, in my judgment, give adequate illumination for outlying streets or suburban roads.

E. F. MCCABE,
Titusville Light & Power Company.

Titusville, Pa.

The Unit of Brightness

To the Editor of the ELECTRICAL WORLD:

SIR:—In your issue of Dec. 12, 1914, Mr. James R. Cravath calls attention to a defect of the ordinary unit of brightness, candle-power per unit area; namely, that it is inconvenient to express in such a unit the brightness of any body in any direction. He suggests that "lumens per unit area, such flux being emitted according to the cosine law," is a much more useful and rational unit of brightness.

I quite agree with Mr. Cravath's statements, but it appears to me that his proposed modification stops just short of a very simple and practical unit of brightness. What the eye sees and estimates as brightness is proportional not to lumens per unit area of emitting surface but to lumens per unit projected area.

In practical work on relative brightness, and in theoretical work on the diffusion and intensity of light passing from one surface to another, whatever units be used one quantity is constantly recurring, namely, the num-

ber of light units per unit solid angle per unit projected area. This corresponds exactly with visual estimates of brightness, whether of a luminous surface or such an object as the sky, where both distance away and inclination of surface are meaningless terms. The designation is a cumbersome one, and I prefer to speak of a brightness as of so many "lamberts." This term is now well understood in our laboratory. Where required it is easily translated into lumens and any desired units of area.

In trying out systems of units to find which are the necessary and sufficient photometric quantities in practical photometry, diffusion and lens work as well as in theoretical work, we are now using the three following and find them quite satisfactory:

Quantity (light watts), visibility times radiation in watts.

Flux (lumens), light watts per unit solid angle.

Brightness (lamberts), lumens per unit projected area.

Both quantity and brightness are connected through the lumen to the flux unit preserved by our standard lamps.

P. G. NUTTING,

Rochester, N. Y. *Research Laboratory, Eastman Kodak Company.*

National Electrical Week

To the Editor of the ELECTRICAL WORLD:

SIR:—I am heartily in sympathy with any movement that promises to be for the benefit of the electric industry as a whole, and as the "electrical week" seems to be of this nature I am thoroughly in sympathy with the proposal.

F. G. SYKES,

New York, N. Y. *President American Power & Light Company.*

To the Editor of the ELECTRICAL WORLD:

SIR:—The suggestion of a "national electrical week" next fall is novel, interesting and worth while. I am to-day writing the chairman of the local League of Electrical Interests, advising him that if it is found feasible and expedient for the league to support such a movement in the city of St. Louis, we will be ready to lend our cordial support.

W. A. LAYMAN,

St. Louis, Mo. *President and General Manager Wagner Electric Manufacturing Company.*

To the Editor of the ELECTRICAL WORLD:

SIR:—It appears to me that the suggestion of a "national electrical week" is a splendid one, and particularly applicable here in San Francisco and immediate territory, owing to the Panama-Pacific Exposition, which has certainly opened up a new field of illumination heretofore unthought of. I shall be very glad to co-operate in any general plan that may be outlined in this matter. I am sure that other companies in this district, together with the manufacturers and jobbers, will also be glad to take a hand. I trust the plan may come to a very ripe fruition.

JOHN A. BRITTON,

San Francisco, Cal. *Vice-president and General Manager Pacific Gas & Electric Co.*

To the Editor of the ELECTRICAL WORLD:

SIR:—We believe that the proposed "national electrical week" movement will be productive of a great deal of good and shall be very glad indeed to co-operate by referring to the "electrical week" in our October advertising in national magazines and by calling the movement to the attention of our dealers throughout the country. There should be some standard expression which all of the electrical advertisers can use in their general publicity, in referring to this "electrical week," as the cumulative effect will be much greater if this be done than it will be if each advertiser handles the campaign differently.

C. H. CLARK,

Springfield, Ohio. *Advertising Manager the Robbins & Myers Company.*

To the Editor of the ELECTRICAL WORLD:

SIR:—The proposal that there be held throughout an entire week of next October a nation-wide electrical jubilee naturally attracts attention and leads to speculation as to the possible benefits to the industry at large.

In many lines it has long been the custom to set aside special periods for the express purpose of exploiting certain classes of goods. We are all familiar with "Friday surprise sales," "June white days," etc., as designated by department stores the country over. In the West we have "Apple Day," "Raisin Day," "Salmon Day," etc., set aside for the purpose of doing homage to these important articles of food, and thereby creating an additional interest in them and promoting their sale. Why not a "national electrical week"?

It goes without saying that in these times no unnecessary additional burden of expense should be imposed upon any of us, and it is quite essential, therefore, that those applying themselves to the exploitation of such an undertaking should be inspired with the determination to formulate plans that will secure extraordinary benefits at the very minimum of expense.

In the case of the "Edison Day" celebration, when the incandescent lamp only was given especial prominence, the success was notable. Mr. Edison's name is frequently on the tongue of almost every American, he is the idol of many a schoolboy, he is almost an institution, and anything with which his name is associated is immediately brought into prominence. There is no doubt that the success of "Edison Day" was largely due to the desire on the part of the country to do honor to Edison the man through the medium of his pioneer electrical invention, the incandescent lamp.

Will the designation "national electrical week" excite an equivalent interest on the part of the general public? That remains to be seen. I am of the opinion that with the proper enthusiastic co-operation of all the allied interests of the electrical industry, both major and minor, there can be worked out by the committee a general plan of procedure which, when applied to individual communities throughout the country, will enable the local federations of electrical interests to make their celebrations a part of the successful whole.

It is difficult for one to form a conception of the tremendous possibilities of such a force as this nation-wide movement undoubtedly will be. The results should be twofold—the stimulation of a better and more extended use of electricity in all lines by those already using it, and the conversion to the ranks of electricity users of many of those who at present are uninformed of its many advantages.

In order to concentrate the minds of all engaged in the industry, from those in the most responsible positions down to those engaged in the humblest occupations, upon the problem of making the "national electrical week" a success of magnificent proportions, it seems to me essential that those in charge should formulate plans of the most ingenious and novel character. The measure of success will be the extent to which everyone in the industry lends active aid.

O. B. COLDWELL,

Portland, Ore. *Gen. Supt. Light and Power Dept., Portland Ry., Light & Power Co.*

Illumination Features of Montreal Station

Improved Lighting Systems Installed in Concourse, Waiting-Room and Train Shed of Reconstructed Windsor Depot of the Canadian Pacific

ONE of the most interesting features of the Windsor station of the Canadian Pacific Railway at Montreal, P. Q., which has lately been reconstructed, is the improved illumination effected in the concourse, train shed and main waiting-room. The terminal is one of the largest in the Dominion. It houses the general offices of the company in addition to the facilities provided for passenger, mail and express traffic. The building is 1100 ft. long over all, with a total width of 350 ft., including the main concourse. Energy for lighting and motor service is supplied by the Montreal Light, Heat & Power Company to a distributing substation in the basement. All wiring is run in conduit, and tungsten lamps are used throughout.

The main concourse is 330 ft. long inside and about 70 ft. wide, with an arched roof of combined concrete and wired-glass monitor construction carried on steel trusses. The illumination is provided by twenty-seven units, composed of six 100-watt lamps each, mounted in hemispherical diffusing globes carried by chains at a height of 19 ft. above the floor. The lighting units are hung in two rows about 36 ft. apart, the individual fixtures being 22 ft. apart longitudinally. One row is carried along the concourse above the ticket offices, telephone and telegraph offices, news stand and principal entrances to waiting-rooms, the other being nearly above the gates leading to the train shed. This distribution greatly reduces the amount of special lighting required at lower levels in the concourse and provides an even and thoroughly satisfactory illumination from one end of the concourse to the other. The train bulletins are of the Hutchinson type, with double inclined panels and a central destination rack in each case, every bulletin being provided with six 15-watt lamps screened from the public by close-fitting horizontal opaque shades. Two lamps and one reflector are pro-

FIG. 1—VIEW SHOWING LIGHTING OF TRAIN SHED

FIG. 2—WINDSOR STATION, MAIN WAITING-ROOM

vided for each section of the bulletin board, the lighting being merely sufficient to accentuate the time of train departure, track number and names of stations.

Eleven parallel tracks enter the train shed, each pair in general being separated by a passenger aisle. The roof is supported by columns set in alternate aisles, and the disposition of lamps conforms to the aisle conditions. Throughout the train shed the illumination is provided by 100-watt lamps carried 14.5 ft. above the platform and mounted in Benjamin steel enameled reflectors fitted to Crouse-Hinds condulets. Six platforms are clear and six are provided with columns. The platforms on which columns are erected are 16 ft. wide, those clear being 10 ft. in width. Above the clear platforms the lamps are carried in a central row 28 ft. apart, there being a standard arrangement of thirty-seven lamps per platform. The columns are spaced 28 ft. apart longitudinally on centers, and between each pair are mounted two lamps spaced 12 ft. apart, there being a total of seventy-two lamps per platform. Between the bumper posts and the concourse a midway 26.5 ft. wide runs the entire width of the station, with a wired-glass partition separating it from the concourse. The lighting of the midway is provided by a pair of 100-watt lamps in line with each track, the lamps being hung 14.5 ft. above the platform and spaced 19 ft. apart, each pair being symmetrically disposed with reference to the center line of the midway. The reflectors of all train-shed lamps are enameled on both surfaces. The longitudinal rows of lamps in the train shed are spaced 22 ft. apart, and the illumination of the platforms forms a notable contrast to the dimly lighted walkways usually associated with railroad stations. In passing from a well-lighted car to the platform there is no material drop in illumination so far as convenience of movement is concerned.

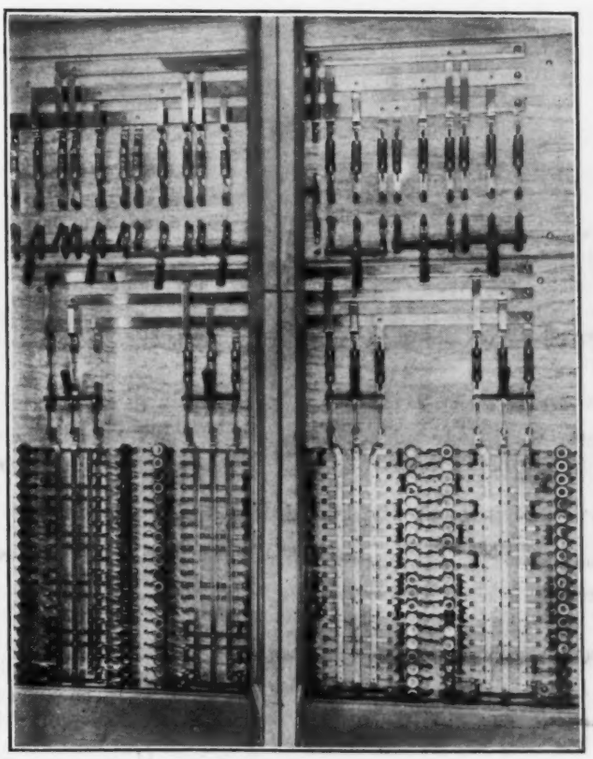


FIG. 3—TYPICAL MAIN-CONTROL-BOARD PANEL

In the main waiting-room the company's engineers have relied entirely upon the illumination furnished by standards carrying a cluster of seven globes each, sixteen of these fixtures being placed along the walls of the room. The waiting-room is 129 ft. long, 58 ft. wide and 25 ft. high; the clusters are spaced 19 ft. apart, and the lower lamps of each group are mounted 9 ft. above the floor. Six 10-in. globes and one 12-in. globe of translucent glassware are used in each case, the lamps being rated at 100 watts each. Energy is fed to the lamps through conduits laid in the floor, with connection to a panelboard in the main corridor. All the lamps in the station are operated on 110-volt alternating-current circuits.

Sag in Overhead Conductors

Brief and Accurate Method of Determining the Effect of Ice and Wind Loads and Temperature Changes Upon Them

BY KENNETH L. WILKINSON

A NUMBER of articles have appeared recently on the method of solving problems relating to the sag and tension in wires under various conditions of temperature and loading. Some of these solutions have been graphical and others analytical. The graphical methods, while simple and readily understood, are to a certain extent objectionable, because they necessitate the use of a sheet of curves which may not always be available when wanted. The analytical methods thus far presented have either been too complicated to permit of easy solution or else have sacrificed accuracy in the attempt to simplify the solution.

The treatment of the sag problem given in this article considers the wire in its original condition, that is, in its unstressed length. This condition forms the basis from which the sag of the wire under any conditions of temperature and loading can be determined. The writer believes this to be the most simple analytical solution of the sag problem that has been given thus far.

Notation:

L = span length in feet.
l_0 = unstressed length of wire in feet per foot of span.
l_1 = stressed length of wire in feet per foot of span with external load (i.e., with ice and wind on wire).
l_2 = stressed length of wire in feet per foot of span without external load but at same temperature as for l_1.
T_1 = tension in pounds in wire with external load.
T_2 = tension in pounds in wire without external load but at same temperature as T_1.
D_1 = sag in feet in wire with external load.
D_2 = sag in feet in wire without external load but at same temperature as D_1.
W_1 = weight in pounds per foot of conductor with external load.
W_2 = weight in pounds per foot of conductor without external load.
a = cross-sectional area of conductor in square inches.
M = modulus of elasticity of conductor material.

In designing a transmission line the following things, among others, must be known:

(1) The most unfavorable conditions of temperature and loading that the wires must withstand.

(2) The tension to be allowed in the wires under these load conditions.

(3) The length of span.

(4) The mechanical properties of the conductor.

Thus, in a design problem are given L, T_1, W_1, W_2, M and a.

The relation between sag and tension in the loaded span is given by the following well-known formula:

$$D_1 = \frac{W_1 L^2}{8T_1} \tag{1}$$

The length per foot of span of the suspended conductor is given by the following formula:

$$l_1 = 1 + \frac{8D_1^2}{3L^2} \tag{2}$$

The unstressed length of the wire per foot of span—that is, the length per foot of span that the wire would assume when taken down and laid on the ground—is equal to the stressed length per foot of span minus the contraction due to releasing the tension in the wire, viz.,

$$l_0 = l_1 - \frac{T_1 l_1}{Ma} \tag{3}$$

The stressed length of the wire per foot of span with the external load (ice and wind) removed will be equal to the unstressed length per foot of span plus the extension due to the tension in the wire loaded only with its own weight, viz.,

$$l_2 = l_0 + \frac{T_2 l_0}{Ma} \tag{4}$$

whence

$$T_2 = \frac{W_2 L^2}{8D_2} \tag{5}$$

Substitution of the value T_2 from equation (5) in equation (4) gives

$$l_2 = l_0 + \frac{W_2 L^2 l_0}{8D_2 Ma} \tag{6}$$

The value of l_2 can also be found from the formula for the length of a suspended wire, viz.,

$$l_2 = 1 + \frac{8D_2^2}{3L^2} \tag{7}$$

Equating (6) and (7) gives

$$1 + \frac{8D_2^2}{3L^2} = l_0 + \frac{W_2 L^2 l_0}{8D_2 Ma} \tag{8}$$

or

$$D_2^2 + D_2 \frac{3L^2}{8}(1 - l_0) = \frac{3W_2 L^2 l_0}{64Ma} \tag{9}$$

From equation (9) the sag in the conductor when the ice and wind load is removed can be determined.

This equation at first glance may appear to be complicated, but upon closer observation it is found to be quite simple, being of the form

$$D_2^2 + BD_2 = C,$$

where B is usually a small number and C in most cases is less than 10,000. This equation can be quickly solved by trial substitution; that is, by inspecting the equation an approximate value of D_2 can be determined. This value is then substituted in the equation, the work being done on the slide rule. If it is found that the value assumed for D_2 is too large, a smaller number is tried. Thus by three or four trials D_2 can be closely determined. The ease with which the solution of equation (9) is effected is illustrated in a problem given in this article.

Changes in temperature are cared for by adding to (or subtracting from) l_0 the amount of elongation (or contraction) in the unstressed wire due to an increase (or decrease) in temperature. That is, for an increase of x degrees.

$$l'_0 = l_0 + (1 + xc) \tag{10}$$

where c is the coefficient of expansion for the conductor.

(This method can also be reversed and used to determine what the sag and tension will be in a wire under the worst conditions of temperature and loading when the sag under normal conditions is given.)

The use of this method can best be illustrated by considering the following problem.

Problem: To find the sag of a No. 0 B. & S. stranded copper wire at 60 deg. Fahr. in a 400-ft. span, such that the wire will have a factor of safety of two at 0 deg. Fahr. when loaded with ice ½ in. thick all around the wire and a wind pressure of 8 lb. per sq. ft. of projected area; the breaking strength of the wire is 4980 lb.

TABLE I—PROPERTIES OF WIRE MATERIAL

Material	Modulus of Elasticity	Coefficient of Expansion per Degree Fahrenheit
Copper, hard-drawn	16,000,000	0.00000960
Copper, soft-drawn	12,000,000	0.00000960
Aluminum	9,000,000	0.00001280
Copper-steel	22,000,000	0.00000367
Steel	29,000,000	0.00000510

TABLE II—COPPER WIRE, STRANDED

Gage, B. & S.	Diameter, Inches	Area, Square Inches	Weight per Foot	Ultimate Tension		*Ma*	
				Hard-drawn	Soft-drawn	Hard-drawn	Soft-drawn
0000	0.530	0.1662	0.645	9,970	5,650	2,659,000	1,994,000
000	0.470	0.1318	0.513	7,910	4,480	2,109,000	1,582,000
00	0.420	0.1045	0.406	6,270	3,555	1,672,000	1,254,000
0	0.375	0.0829	0.323	4,970	2,820	1,326,000	945,000
1	0.330	0.0657	0.255	3,949	2,235	1,051,000	788,000
2	0.291	0.0521	0.203	3,130	1,770	834,000	625,000
3	0.261	0.0413	0.160	2,480	1,405	661,000	496,000
4	0.231	0.0328	0.127	1,970	1,115	525,000	394,000
5	0.206	0.0260	0.101	1,560	885	416,000	312,000
6	0.184	0.0206	0.080	1,235	700	330,000	247,000

TABLE III—COPPER WIRE, SOLID

Gage, B. & S.	Diameter, Inches	Area, Square Inches	Weight per Foot	Ultimate Tension		*Ma*	
				Hard-drawn	Soft-drawn	Hard-drawn	Soft-drawn
0000	0.460	0.1662	0.641	8,310	5,650	2,659,000	1,994,000
000	0.410	0.1318	0.509	6,590	4,480	2,109,000	1,582,000
00	0.365	0.1045	0.403	5,220	3,555	1,672,000	1,254,000
0	0.325	0.0829	0.320	4,560	2,820	1,326,000	945,000
1	0.289	0.0657	0.253	3,740	2,235	1,051,000	788,000
2	0.258	0.0521	0.202	3,120	1,770	834,000	625,000
3	0.229	0.0413	0.159	2,480	1,405	661,000	496,000
4	0.204	0.0328	0.126	1,960	1,115	525,000	394,000
5	0.182	0.0260	0.100	1,560	885	416,000	312,000
6	0.162	0.0206	0.079	1,240	700	330,000	247,000

TABLE IV—ALUMINUM WIRE, STRANDED

Gage, B. & S.	Diameter, Inches	Area, Square Inches	Weight per Foot	Ultimate Tension	*Ma*
500,000	0.814	0.3924	0.460	9,025	3,532,000
450,000	0.772	0.3535	0.414	8,130	3,182,000
400,000	0.725	0.3141	0.368	7,225	2,827,000
350,000	0.679	0.2750	0.322	6,325	2,475,000
300,000	0.621	0.2360	0.276	5,430	2,124,000
250,000	0.567	0.1965	0.230	4,520	1,769,000
0000	0.522	0.1662	0.195	3,820	1,496,000
000	0.464	0.1318	0.155	3,160	1,186,200
00	0.414	0.1045	0.122	2,510	941,000
0	0.368	0.0879	0.097	1,990	746,000
1	0.328	0.0657	0.077	1,575	591,000
2	0.291	0.0521	0.061	1,250	469,000
3	0.261	0.0413	0.049	990	372,000
4	0.231	0.0328	0.039	790	295,000

The data and calculations are then as follows:

$T_1 = 2490$ lb.

$W_1 = 1.26$ lb. (resultant load of ice, wind and weight of conductor).

$W_2 = 0.323$ lb.

$a = 0.083$ sq. in.

$M = 16{,}000{,}000$.

$L = 400$ ft.

(1) $$D_1 = \frac{1.26 \times 400^2}{8 \times 2490}$$

$D_1 = 10.1$ ft. sag at 0 deg. Fahr. under maximum load.

(2) $$l_1 = 1 + \frac{8 \times 10.1^2}{3 \times 400^2}$$

$l_1 = 1.0017$ ft.

(3) $$l_0 = 1.0017 - \frac{2490 \times 1.0017}{16{,}000{,}000 \times 0.083}$$

$l_0 = 0.99983$ ft.

(9) $$D_2^2 + D_2 \frac{3 \times 400^2}{8}(1 - 0.99983) = \frac{3 \times 0.323 \times 400^4 \times 0.99983}{64 \times 16{,}000{,}000 \times 0.083}$$

$D_2^2 + 10.2D_2 = 292.$

Upon inspecting this equation it is seen that the value of D_2 will be such that its cube will be less than 292. Take $D_2 = 6$, then

$216 + 61.2 = 277.2$, which is too small.

Take $D_2 = 6.2$, then

$238 + 63.3 = 301.3$, which is too large.

From this it is seen that D_2 is nearly 6.2 ft. This is close enough for all practical purposes, but if more accurate results are desired another trial can be made.

Take $D_2 = 6.13$, then

$230 + 62.5 = 292.5$,

whence $D_2 = 6.13$ ft. sag at 0 deg. Fahr. with load off.

To find sag at 60 deg. Fahr. the calculations are as follows:

(10) $l'_0 = 0.99983\ (1 + 60 \times 0.0000096)$,

and

$D_2^2 - 24.4D_2 = 292$,

from which

$D_2 = 7.85$ ft. sag at 60 deg. Fahr. with load off.

Unless it is desired, it is not necessary to determine the sag at 0 deg. Fahr. with the load off. After the unstressed length at 0 deg. Fahr. is determined the temperature change as expressed in equation (10) can be applied directly to equation (9) and the sag at the desired temperature with the load off can at once be determined.

The results found by this method check the results found by using the graphical method described in the June, 1911, *Proceedings* A. I. E. E., "Sag Calculations for Suspended Wires," by Percy H. Thomas.

The acompanying tables will be found of assistance in solving sag problems.

Proper Lighting as a Factor in Good Health

The importance of proper illumination as a factor in maintaining the health of the individual and the community was emphasized in several of the exhibits of the City Club Public Health Exhibition recently held at Chicago. Operating models showing schoolroom, shop and living-room lighting were loaned by the Illuminating Engineering Society for the exhibition. Placards told the story of the proper lighting in graphic language and pointed out the poor judgment displayed in impairing the services of a good workman earning, say, 50 cents per hour, by giving him improper illumination when the best lighting does not cost more than 2 cents per hour. The exhibit was in charge of the club's committee on environmental conditions.

Small-Town Distribution and Management Cost

Data for the Last Fiscal Year Apportioned to Show the Actual Expense Incurred by the Manhattan (Kan.) Company in Supplying Electricity to Customers

AT the close of the fiscal year last June, Mr. E. A. Wright, manager and contract agent of the Manhattan (Kan.) Ice, Light & Power Company, sought to apportion among the various classes of customers the company's approximate distribution and overhead expense. In order that the data given might correspond more closely with the figures to be expected under the conditions of a normal year, Mr. Wright revised some of the individual items, making the necessary additions and reductions. That, on the whole, the approximations thus arrived at correspond closely, however, with the actual operating expenses of the company will be evident from a comparison of the totals. Since the Manhattan company is a distribution organization, purchasing most of its energy from a water-power company, production costs were not considered in Mr. Wright's analysis. The actual operating expenses, including interest and depreciation but exclusive of energy production and purchase, were $29,292.42, while the total as used in this analysis was made $29,290 for the sake of round numbers.

Manhattan boasts of a population of 7800 people, not including 2500 students who reside in the city nine months of each year. The Manhattan Ice, Light & Power Company had on its lines last year an average of 1472 meters, of which number 1179 were used for residence-lighting installations, 252 measured energy for business lighting, and 41 served motor users.

Method of Classification

In making the analysis the service was classified under the heads of residence lighting, business lighting, street lighting and motor service.

The operating expenses and fixed charge accounts were divided into three classes, as follows: Class A, those which can be apportioned on a connection or meter basis; Class B, those which should be apportioned according to the investment; Class C, those which are wholly chargeable to any particular class of service. This classification was made, of course, purely for the purpose of this analysis and is not actually followed in the routine accounting of the company.

Under the head of Class A the items in Table I are included. In Table I several accounts have been thrown together for convenience. For instance, under "maintenance of commercial customers' installations" are in-

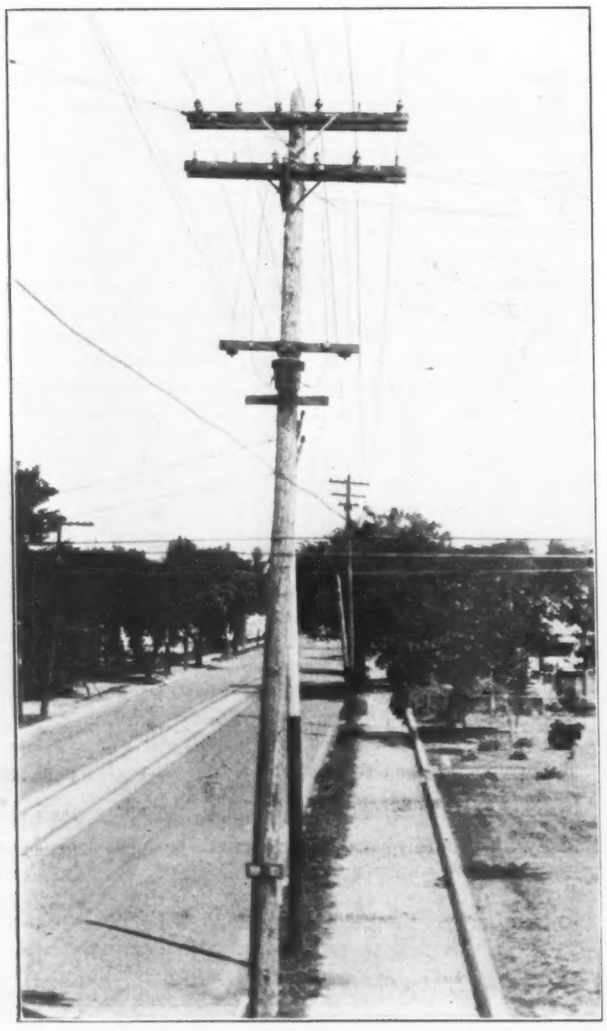


FIG. 1—FEEDER LINE NEAR PLANT

FIG. 2—TYPICAL DISTRIBUTING LINE IN ALLEY

cluded free renewals of carbon lamps, replacing of fuses blown out by lightning or other causes beyond the customer's control, inspection of customers' premises, and such other free service as is rendered to customers. Under "accounting" are placed salaries of clerks, postage, stationery, etc. "General office expense" includes janitor service, office lighting and such other items of expense as are chargeable to the maintenance of the office. Under "general expense" are included care of horses, horse feed, horse shoeing, maintenance of harness, wagons, etc. The other accounts, which are, it is believed, self-explanatory, follow the practice recommended in the report of the accounting committee at the 1913 convention of the National Electric Light Association.

TABLE I—ITEMS APPORTIONED ON A METER BASIS

Setting and removing meters	$50
Maintenance of service	15
Maintenance of meters	110
Maintenance of commercial customers' installations	430
Reading meters	360
Management	1,800
Accounting expenses	2,615
General office expense	955
Liability insurance	240
General expense	1,570
Interest paid on guarantee deposits	20
Total Class A	$8,165

Apportionment of Expenses

Many utility managers will agree that practically all of the above expenses can be apportioned equally among the company's consumers at so much per consumer or so much per meter. For instance, an electric-light customer with a 50-cent monthly bill will take up just as much of the clerks' and manager's time as a $100-a-month lighting customer or a $200-motor-service customer. The office will receive about as many trouble calls from the 50-cent customer as from the $100 customer. The meter of the 50-cent customer requires as much attention as that of the $100 customer, and for these reasons the above total of $8,165 can be apportioned among the various classes of service according to the number of meters. The apportionment is given in Table II.

TABLE II—APPORTIONMENT OF CLASS A EXPENDITURES

Residence lighting (1179 meters)	$6,542
Business lighting (252 meters)	1,395
Power (41 meters)	228
Total, Class A	$8,165

For the reason that the street lighting requires but one connection and one account, none of the above operating expenses has been charged to it. Although this class of service should bear its share of the management and accounting expenses, the charge would be so small as to be negligible in the total results.

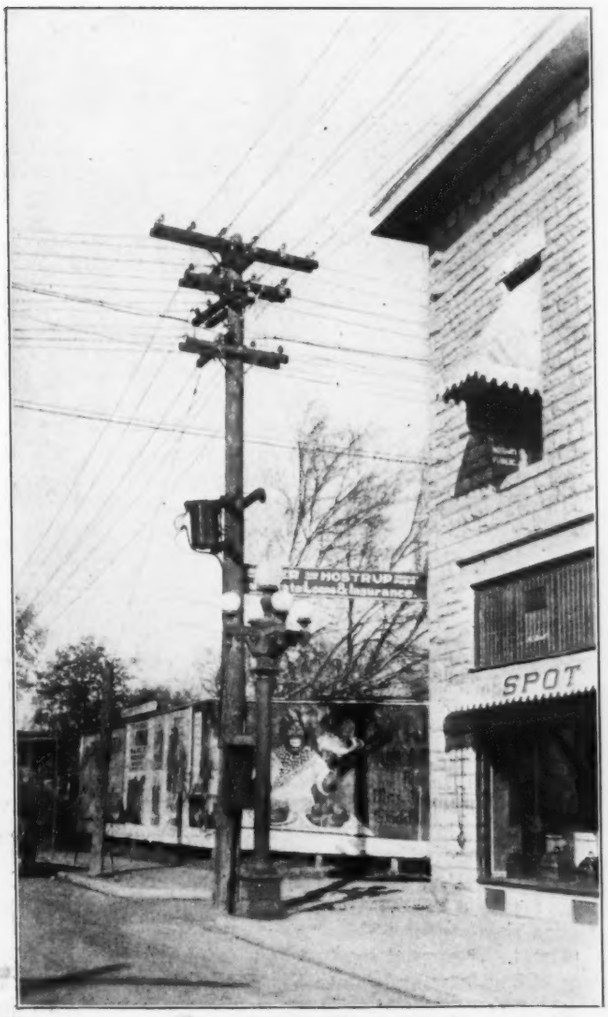


FIG. 3—JUNCTION POLE IN BUSINESS DISTRICT

FIG. 4—FIXTURE USED IN RESIDENCE DISTRICT

Figures for Class B, including fixed charges and operating expenses which should be apportioned according to the investment for each class of service, are given in Table III.

TABLE III—EXPENSES APPORTIONED ACCORDING TO INVESTMENT

Maintenance of pole line and distributing system	$390
Maintenance of transformers	40
Taxes	1,480
Interest on investment at 8 per cent	12,500
Depreciation	6,110
Total, Class B	$20,520

The portion of the plant of the Manhattan Ice, Light & Power Company used in the manufacture and distribution of electricity has been valued at approximately $155,000 by a reputable firm of consulting engineers. This investment has been apportioned among the various classes of service in Table IV.

TABLE IV—APPORTIONMENT OF CAPITAL ACCOUNT

Residence lighting	$90,000
Business lighting	50,000
Motor service	5,000
Street lighting	10,000
Total	$155,000

The investment in the generating station was apportioned by analyzing the peak load. The maximum or peak load comes on Saturday night, and at that time the business lighting is all in operation while the residence lighting is less than normal owing to the fact that a great many of the students and townspeople are down town. The motor-service load is all off-peak load and therefore none of the investment in power plant can be properly apportioned to this class of service. The street-lighting load is constant and continues over the peak load; therefore it should take its portion of the power-plant investment. The investment in power plant was apportioned in the ratio of 60, 30 and 10 per cent to residence lighting, business lighting and power respectively. The apportionment of transformers, meters and service wires was arrived at by a division of the actual value of transformers, meters and material used in each class of service. Division of the investment in the distributing system required considerable calculation and some arbitrary assumptions. On the basis of the division of investment, Class B operating expenses and fixed charges can be apportioned to the various classes of service as shown in Table V.

TABLE V—EXPENSE CHARGEABLE TO INVESTMENT

Residence lighting	$11,900
Business lighting	6,620
Street lighting	1,335
Motor service	665
Total Class B	$20,520

Under Class C operating expense there is but one item, namely, maintenance of street-lighting service, including patrol service, renewals, trimming of arcs and, in fact, all material and labor which is chargeable to the operation of the street-lighting system. The total of this expense is $605.

The recapitulation of the expenses shows the apportionment of the total operating expenses chargeable to residence lighting from Class A to be $6,320, from Class B $11,900, and from Class C nothing. The total is $18,220.

During the year the energy consumed in residence lighting as measured by customers' meters was 244,913 kw-hr., so that the overhead charges and distribution charges per kw-hr. are equal to $18,220 divided by 244,913, or approximately 7.45 cents per kw-hr.

Apportionment of expenditures chargeable to business lighting from Class A was $1,305, from Class B $6,620, and from Class C nothing, making the total $7,925.

Meter records show that 184,784 kw-hr. was consumed in business lighting, so that the operating expenses per kw-hr. equal $7,925 divided by 184,734, or approximately 4.29 cents per kw-hr.

Operating expenses apportioned to street lighting

FIG. 5—ONE OF FORTY-TWO "WHITE-WAY" POSTS DOWN TOWN

were as follows: From Class A nothing, from Class B $1,335, and from Class C $605. The total is $1,940.

During the year the energy consumed in street lighting, including the losses in the street-lighting circuits, was 79,200 kw-hr.; therefore the distribution charges and overhead expense per kw-hr. equal $1,940 divided by 79,200, or approximately 2.45 cents per kw-hr.

The operating expenses apportioned to motor service were: Class A $220, Class B $665, and Class C nothing. Hence the total is $885.

The total annual energy consumed in motor service was 478,884 kw-hr.; hence the fixed charges and operating expenses per kw-hr. are equal to 885 divided by 478,884, or approximately 0.1845 cent per kw-hr.

In arriving at these figures no consideration has been

given to line losses, except in the case of street lighting. For the fiscal year the line losses amounted to a total of 20 per cent. Not having separate station meters for each class of service, the company was unable to determine the exact proportion of this loss to assign to each class of service. However, it was deemed reasonable to suppose that the loss for residence and for business lighting is in excess of 20 per cent, while that for motor service is considerably less than 20 per cent. But, assuming that each class of service, with the exception of street lighting, bears the same percentage of distributing losses, the costs as determined should be increased by 20 per cent, which would bring the cost of residence lighting up to 8.95 cents per kw-hr., business lighting to 5.15 cents per kw-hr., street lighting to 2.45 cents per kw-hr., and motor service to 0.221 cent per kw-hr. If the energy costs 2 cents per kw-hr. at the switchboard, residence-lighting customers should pay a net average per kw-hr. of 10.95 cents; business lighting, 7.15 cents; motor service, 2.221 cents, and street lighting, 4.45 cents.

What the Analysis Showed

In drawing conclusions from this analysis at the recent convention of the Kansas Gas, Water, Electric Light and Street Railway Association, Mr. Wright said: "It should be borne in mind that the average cost per kilowatt-hour at the switchboard has been greatly reduced, to the benefit of the lighting customer, by the sale of a large amount of motor service at a very low price. In fact, where nearly all energy is purchased from a water-power company, and where the principal item of operating expense in the station consists in maintaining the steam auxiliary plant and keeping an operating crew on duty at all times, as is the case at Manhattan, the unit cost at the switchboard is not so greatly affected by the output as in the case of a plant operated wholly by steam. But even in the case of the Manhattan company the lighting customer is receiving almost the entire benefit of the reduction in the cost of energy at the switchboard by reason of the sale of a large amount of energy for motors. At the same time he is being benefited indirectly through the sale of energy to the city at a price less than cost for pumping water, it being assumed, of course, that he is receiving water from the city at cost.

"Concerning the actual management and clerical expense per meter," continued Mr. Wright, "by referring to the operating expenses under Class A it will be found that this disbursement amounted to $8,165 for a total of 1472 meters, which is approximately $5.55 per meter per year, or 46.5 cents per meter per month. To arrive at a minimum charge which will not result in a loss to the company the interest and depreciation on meter and service should be added to this figure. The average cost of the service may be taken to be approximately $4, while the cost of an ordinary 5-amp meter, including first installation, may be taken approximately at $7, making the total cost of a service $11. Assuming depreciation at 6 per cent and interest at 8 per cent, we have a fixed charge of $1.54 a year, or 12.8 cents a month, to add to the management expense, making a total of approximately 60 cents a month. If this 60-cent minimum charge be added to the cost of energy, the result seems to indicate that a minimum of 75 cents per month per meter for lighting service is in this case none too high."

A good idea of the Manhattan Ice, Light & Power Company's system may be had from the illustrations accompanying this article. Fig. 1 shows a feeder line, Fig. 2 a line running through an alley, Fig. 3 a junction pole in the business district, Fig. 4 a street-lighting fixture in the residential section, and Fig. 5 one of the forty-two handsome fixtures that are installed along the "white way" in the down-town district.

CONCRETE TRANSMISSION-LINE POLES

Advantages and Disadvantages of Their Employment—Method of Test and Construction Details

BY R. D. COOMBS

NOW that experience has shown concrete poles to be suitable for supporting conductors, the method of their construction depends on their location or importance in the line. The characteristics of wooden poles which have supported and are still supporting wires will serve as a guide in designing concrete poles which are to be used in similar service.

When steel is embedded in well-made concrete the life of the reinforced structure is practically indefinite. Chief among the advantages of concrete poles are that they can be spaced farther apart than wooden poles, that they resist fire, and that they are not attacked by fungi or insects in damp climates. By forming an axial passage through concrete poles while molding, wires can

FIG. 1—LOADING CONCRETE POLES

be run concealed from the tops to the bottoms at very little additional expense. Reinforced-concrete poles when subjected to an overload do not fail by breaking off like wooden poles, but bend and are held in place by the reinforcement. If properly designed, a concrete pole will deflect to equalize moderate unbalanced loads without cracking.

One disadvantage of concrete poles is their weight and its effect on the cost of transporting and erecting. Some construction engineers claim that this objection can be avoided by casting the poles in place. The writer believes, however, that no advantage can be derived from this procedure as it would require considerable expense and labor to transport forms, water and other materials from one location to another.

A number of freak designs have been developed, but none of these poles appears to have qualities which commend it. Concrete-incased poles are neither theoretically nor practically desirable, and it is doubtful whether another trial will be given to them. Triangular poles, which are rather hard to climb, are weaker in one direction than in the opposite direction. Paneled poles, which are employed to some extent in Germany, are light in weight, but the same advantage can be obtained from hollow cylindrical poles, which are generally more desirable.

Poles with unsymmetrical sections—that is, thicker in the direction of the greater stress—may be employed,

but they may be objectionable because of their appearance. In general, square, octagonal or circular poles are preferable, being more sightly and easier to construct. The minimum diameter for pole tops should be 6 in., which should be increased for strength and appearance in cases where long poles or heavy lines are employed.

If small surface cracks develop in concrete poles during seasoning they may be filled with cement, but this is not effective if the cracks are caused by faulty design, as a subsequent application of load will open the crevices again. Cracks in poles are objectionable because they allow moisture to attack the reinforcement. To prevent this condition poles should have considerable strength provided for local stresses and should be manufactured under competent supervision. On the New Jersey meadows along the Pennsylvania Railroad is one of the heaviest concrete-pole installations in the country. It was designed by the writer to withstand moisture in the peaty bog, which is fairly dry only in the summer.

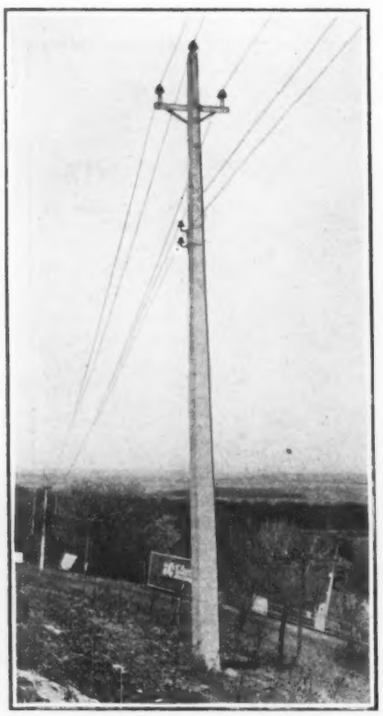


FIG. 2—CONCRETE POLE

FIG. 3—POLE UNDER 6000-LB. TEST PULL

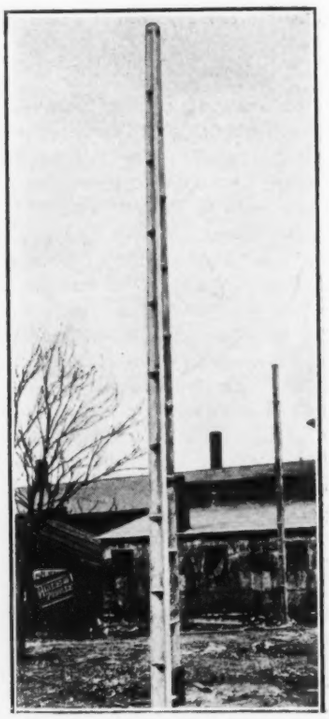


FIG. 4—STAR-SECTION POLE

Distribution of Reinforcement

It is now generally conceded in reinforced-concrete work that the finer the distribution of metal the greater will be the homogeneity and strength of the structure. However, in poles where concrete is deposited in narrow forms other conditions modify the distribution. If the metal in a square pole is concentrated in four equal areas, at each corner, the pole will be equally strong either in the direction of or at right angles to the line.

Other or finer distributions of reinforcement to give equal strengths in the same directions require more material. Furthermore, construction is simplified if the metal is concentrated. Ample web reinforcement resists vertical shearing stresses. As high-carbon steel with a high elastic limit and a correspondingly richer mixture of concrete are being used in other fields of reinforced-concrete work to permit high working stresses, it seems reasonable to follow this practice in pole construction.

Construction Details

When considerable reinforcing metal is employed it is important to tamp or puddle the concrete as deposited to prevent air pockets and provide the maximum adherence of metal to the concrete. Mechanical bond or deformed bars (twisted square rods, etc.) are superior to smooth bars for reinforcing as stresses in the concrete affect them more uniformly and rapidly over their entire area. The metal may be medium-grade steel with an ultimate strength of 60,000 lb. to 70,000 lb. per square inch and an elastic limit of 30,000 lb. to 40,000 lb. per square inch and capable of being bent cold about its own diameter, or it may be high-carbon steel with an ultimate strength of 80,000 lb. to 100,000 lb. per square inch and an elastic limit of 40,000 lb. to 60,000 lb. per square inch and capable of being bent cold without fracture about a radius of four times the diameter of the rod. Poles having similar dimensions and distribution of reinforcement but made of each of these materials will not be similar in characteristics, as the elastic limits are different; hence tension surface cracks occur at different stresses. When poles are subjected to torsion, diagonal or spiral reinforcing should be employed, although closer spacing of the longitudinal bars will help appreciably. Horizontal ties are needed primarily to restrain the rods from buckling and thereby prevent the concrete spalling off and depreciating the bond. Cast-iron rings or bands should never be used for horizontal ties as they have low tensile strength.

Removing Poles from Forms

Concrete poles should not be removed from forms until they have been allowed to set firmly. The forms should be kept covered during setting, particularly when exposed to direct sunlight in hot weather. After removing from the forms the poles should be well sprinkled and kept under canvas for several days. A freshly made pole cannot be rolled or handled with impunity until it is well set. When poles are moved it should be done by attaching slings to two separate points. Bolt holes and step-bolt sockets should be cast in the poles. Hardwood blocks may be molded in the concrete to re-

ceive step bolts, but cast or spiral sockets are preferable. Plastering the surface of a pole to remove pockets and produce a finished appearance is particularly objectionable. Much better and more desirable results can be obtained by rubbing the concrete to a fine surface.

The most commonly used concrete mixture for poles consists of one part Portland cement, two parts sand and four parts broken stone or gravel. It should be mixed wet and tamped and churned to eliminate air bubbles, insure good contact between the reinforcement and concrete, and obtain a good surface. When so made a pole has an average compressive strength of about 1000

FIG. 5—CONCRETE POLES SET IN PEATY BOG

lb. per square inch after seven days' seasoning, 2400 lb. after one month, 3000 lb. after three months and 3500 lb. in six months.

Water-Power Development on Oregon Public Land

The annual report of the Oregon Conservation Commission says that the controversy which for some time has engaged the attention of those interested in the development of water-power and the use of public lands in connection therewith has apparently reached the point where a settlement of the divergent views seems not only possible but probable. The commission says in part:

"Assuming that all stand on the same platform—protection of public rights, encouragement of investment and development—how are investment and development to be secured? In but two ways—public ownership, or private ownership subject to governmental control. At the present time it is becoming increasingly difficult to induce investment by individuals in public service utilities. If this country is to rely upon the national treasury for all its development of a public and quasi-public character, we fear it will be a long time before the West will be opened up. Indeed, it may be doubted, in view of the pressing problems in other directions, and even should the desire for public ownership of all utilities become infinitely more pronounced than it now is, whether the government could possibly meet the requirements and demands that would be made upon it. Therefore, unless public ownership is to be accepted as a settled policy, the investor must have fair consideration if his capital is to be depended upon for development. Generally speaking, in the West the investor faces two problems—the development of power and the creation of a market for it. In many cases, unless there is power development, large sections of the West are doomed to remain a desert.

"If provision be made for diligence in use and development, prevention of unregulated monopoly, for control of rates and service by states on state business and by the federal government on interstate business, with the right on the part of the state or nation to take over the physical property at its fair value after the expiration of a fixed term, it would seem the public interest will be properly protected. Such value should not include the franchise, good will or water rights. On principle we believe the national government has the right to exact a charge for the use of national property, as have the states for state property. However, as a matter of good business policy, from a public standpoint and from that of the farmer, the miner and the manufacturer, we believe it inexpedient and unwise to make any substantial charges either directly or indirectly for the use of the rights under discussion now or for years to come."

CENSUS RETURNS ON ELECTRIC LAMPS

Great Development of Incandescent Type and Decrease in Arc Lamps in Service

Statistics of electric lamps wired for service are given in the returns of the Bureau of the Census for 1912. Owing to the absence of perfect records, the numbers of lamps are estimated. Lamps are grouped in three classes—arc, incandescent and, lastly, other varieties such as Nernst, vapor, etc. The only gain from 1907 to 1912 was in incandescent lamps. Arc lamps, which for all stations reported increased from 419,561 in 1902 to 635,815 in 1907, decreased to 560,981, or a loss of 11.8 per cent, in 1912. In all three of the census periods the larger proportion of the total arc lamps in use were in public service, although in 1907 almost as large a number were in commercial use; in 1902 54.7 per cent of the total were in public use; in 1907 50.1 per cent; in 1912 69.3 per cent.

The great development of the incandescent lamp is shown by the fact that the estimated number in use in 1907 was 134.2 per cent greater than in 1902. In 1912 the gain was 86 per cent over 1907. The increase in the decade from 1902 to 1912 was 335.7 per cent. The largest proportion of the incandescent lamps in use were reported for lamps in commercial service, although the number in public use showed large increases in percentage; in 1902 97.6 per cent of the incandescent lamps were in commercial use, in 1907 98.1 per cent and in 1912 97.5 per cent. The number of incandescent lamps in public use in 1912 was about two and one-half times the total reported for 1907; the 1912 total represented a gain of 353.5 per cent over that reported ten years earlier. The number in commercial use in 1912 was 335.3 per cent greater than in 1902. The number in commercial use in 1912 showed a gain of 84.8 per cent over 1907.

The large extent of the use of incandescent lamps is shown by the total estimated number in 1912 of 85,557,819. Of this total 76,484,096 were reported by commercial and municipal central stations combined and 9,073,723 by electric light and power departments of electric railways. The large proportion of the total were reported by commercial central electric stations, which showed 69,428,356, or 90.8 per cent of the aggregate for all central electric stations, leaving 7,055,740, or 9.2 per cent, for municipal stations. The relative increases in incandescent lamps reported by municipal and commer-

cial stations were not widely different. Incandescent lamps reported by municipal stations gained 156.9 per cent from 1902 to 1907 and 74.1 per cent from 1907 to 1912. The corresponding figures for commercial stations were 125 per cent in the earlier period and 85.7 per cent in the later period. Different tendencies, however, were shown in arc lamps, where municipal stations increased 63.3 per cent in 1907 as compared with 1902 and 10.7 per cent in 1912 as compared with 1907. Commercial stations reported an increase from 1902 to 1907 of 41.2 per cent and a decrease from 1907 to 1912 of 12.5 per cent. Commercial central stations reported, therefore, a decreasing proportion of the arc lamps shown by the two classes of central stations combined. In 1902 they reported 86.8 per cent, in 1907 the proportion was 85.1 per cent, and in 1912 it had been reduced to 81.8 per cent.

TABLE I—CENTRAL ELECTRIC STATIONS AND STATIONS OPERATED IN CONNECTION WITH ELECTRIC RAILWAYS—ESTIMATED NUMBER OF LAMPS WIRED FOR SERVICE

	Arc			Incandescent			Other Varieties—Nernst, Vapor, Etc.	
	Total	Public	Commercial	Total	Public	Commercial	Public	Commercial
Total 1912	560,981	388,592	172,389	85,557,819	2,152,612	83,405,207	1,743	57,470
1907	635,815	318,819	316,996	45,991,836	866,851	45,124,985	6,090	184,889
1902	419,561	229,403	190,158	19,636,729	474,686	19,162,043	*	*
Commercial central stations 1912	413,544	267,113	146,431	69,428,356	1,602,855	67,825,501	491	20,446
1907	472,773	216,309	256,464	37,393,549	638,456	36,755,093	4,584	148,884
1902	334,903	166,723	168,180	16,616,593	372,740	16,243,853	*	*
Municipal central stations 1912	91,851	84,745	7,106	7,055,740	430,976	6,624,764	421	1,688
1907	82,940	73,082	9,858	4,052,448	170,237	3,882,211	1,132	7,738
1902	50,795	45,002	5,793	1,577,451	82,920	1,494,531	*	*
Electric railways 1912	55,586	36,734	18,852	9,073,723	118,781	8,954,942	831	35,336
1907	80,102	29,428	50,674	4,545,839	58,158	4,487,681	374	28,267
1902	33,863	17,678	16,185	1,442,685	19,026	1,423,659	*	*

*Not reported separately.

The increasing importance of incandescent lamps and the decreasing use of arc lamps are shown further by the statement that of the total number of lamps of all kinds, the number of arc lamps, which amounted to 2.1 per cent in 1902 and to 1.3 per cent in 1907, was but 0.7 per cent in 1912. Table I shows statistics of lamps wired for service for all classes of stations reporting and also the total separately for commercial central stations, municipal central stations, and electric railways reporting for their electric light and power departments.

TABLE II—COMMERCIAL AND MUNICIPAL CENTRAL STATIONS—ESTIMATED NUMBER OF LAMPS WIRED FOR SERVICE IN DIFFERENT GEOGRAPHIC DIVISIONS

	Census	Arc	Incandescent and Other Varieties
United States	1912	505,395	76,507,142
	1907	*555,713	*41,608,335
	1902	385,698	18,194,044
Geographic divisions:			
New England	1912	44,682	7,957,913
Middle Atlantic	1912	181,582	22,103,919
East North Central	1912	138,042	18,600,072
West North Central	1912	40,860	8,327,927
South Atlantic	1912	21,389	3,887,442
East South Central	1912	18,365	2,147,461
West South Central	1912	19,645	3,286,431
Mountain	1912	9,926	2,239,337
Pacific	1912	30,904	7,956,640

*Exclusive of 7082 arc and 267,997 incandescent lamps reported by electric companies to light their own properties.

Table II shows the estimated number of lamps of all kinds wired for service, as reported by central stations according to the geographic divisions which are followed in census reports. The names of the states composing the different divisions were published in the ELECTRICAL WORLD on Jan. 16, 1915, page 161. The Middle Atlantic and East North Central States reported 63.2 per cent of the arc lamps and 53.2 per cent of the incandescent lamps. Of the total of 76,507,142 "incandescent and other varieties" of lamps a few states reported large individual totals. New York was first with a total of 12,884,911, or 16.8 per cent of the entire amount; Illinois had 7,375,539, or 9.6 per cent; California, 6,793,200, or 8.9 per cent; Pennsylvania, 6,257,665, or 8.2 per cent, and Massachusetts, 4,687,246, or 6.1 per cent.

For municipal and commercial electric central stations combined there was an average of ninety-seven arc lamps per station in 1912 as compared with 118 in 1907 and 107 in 1902. The average number of incandescent lamps per station was 14,649 in 1912, 8792 in 1907 and 5026 in 1902.

Lamps Used in Street Lighting

The schedule for the 1912 census contained for the first time since the census of the electrical industry started an inquiry as to the number of arc and incandescent lamps used for street lighting. Out of the total of 505,395 arc lamps reported by commercial and municipal central electric stations, 348,643, or 69 per cent, were for street lighting. Of the total number of arc lamps used for street lighting, 75.8 per cent were reported by commercial stations and 24.2 per cent by municipal stations. Out of the total of 76,484,096 incandescent lamps reported by both classes of central electric stations, 681,379, or 0.9 per cent, were street lamps. Of the total number of incandescent street lamps 474,048, or 69.6 per cent, were reported by commercial stations, and 207,331, or 30.4 per cent, by municipal stations.

Of the total number of incandescent lamps used for street lighting California had 75,802, or 11.1 per cent; Massachusetts, 67,372, or 9.9 per cent; New York, 62,706, or 9.2 per cent, and Illinois, 41,065, or 6 per cent. Table III shows the number of lamps reported by commercial and municipal electric central stations, the totals used for street lighting and the percentage of distribution as between commercial and municipal.

TABLE III—COMMERCIAL AND MUNICIPAL CENTRAL ELECTRIC STATIONS—LAMPS USED FOR STREET LIGHTING, BY GEOGRAPHIC DIVISIONS, 1912

	Arc Lamps		Incandescent Lamps*		Per Cent Distribution of Each Class of Street Lamp			
					Arc		Incandescent	
	Total for All Purposes	Street Lamps Total	Total for All Purposes	Street Lamps Total	Commercial	Municipal	Commercial	Municipal
United States	505,395	348,643	76,484,096	681,379	75.8	24.2	69.6	30.4
Geographic divisions:								
New England	44,682	29,633	7,955,766	124,142	90.4	9.6	77.9	22.1
Middle Atlantic	181,582	109,039	22,096,036	125,044	92.5	7.5	93.4	6.6
East North Central	138,042	106,688	18,590,902	114,419	54.3	45.7	48.3	51.7
West North Central	40,860	24,751	8,327,129	102,152	73.0	27.0	58.5	41.5
South Atlantic	21,389	17,679	3,886,979	44,142	55.5	44.5	62.5	37.5
East South Central	18,365	15,247	2,147,154	18,816	70.6	29.4	51.8	48.2
West South Central	19,645	14,326	3,285,680	27,083	77.3	22.7	68.1	31.9
Mountain	9,926	8,150	2,239,281	23,317	96.7	3.3	75.2	24.8
Pacific	30,904	23,139	7,955,178	102,264	90.4	9.6	70.8	29.2

*Exclusive of 23,046 lamps of other varieties, 578 of which were used for street lighting.

DIGEST OF ELECTRICAL LITERATURE

Generators, Motors and Transformers

Transformer and Switch Oil.—An extensive report of a sub-committee of the British Institution of Electrical Engineers signed by W. P. Digby and summing up the replies received to a number of inquiries. Sludge formation in transformer oil is first taken up. It is suggested that to a certain extent it is possible that modern transformers with large oil surfaces in contact with the atmosphere may undergo profound modification in character, and that the Continental European practice of employing closed transformers with expansion vessels having only a small surface in contact with the air is likely to be widely adopted in England. T. C. Thomsen's method of carrying on laboratory tests is considered sound as far as it goes. It is described by Thomsen as follows: Consider a transformer containing, say, 1000 gal. of oil, having a free oil surface of

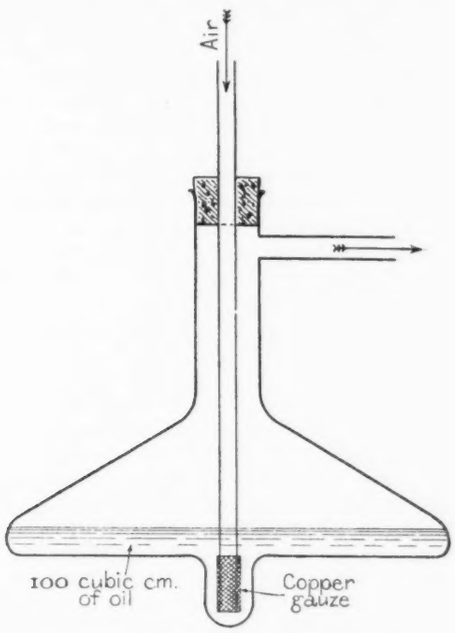


FIG. 1—APPARATUS FOR HEATING TRANSFORMER OIL

20 sq. ft. and working at a maximum oil temperature of 160 deg. Fahr. To reproduce one year's service on a 100-cu. cm sample of transformer oil (about 0.02 gal.) this sample would require to be heated for one year in contact with air covering a free surface of 20/50,000 sq. ft., and if this test is to be carried out during twenty-four hours, the free surface in contact with the air should be 365 times as great, or approximately 20 sq. in. This would mean heating the oil at a temperature of 160 deg. Fahr. for twenty-four hours in a bottle with a flat bottom, about 5 in. in diameter (see Fig. 1) and bubbling a very slight known quantity of air through the oil, say 2 liters per hour. Michie has shown that on blowing the air through the oil in which copper is present this metal has a catalytic effect, increasing the rate of oxidation to about four times what it would have been had the copper been absent under the conditions existing during his tests. If, therefore, the air were introduced through copper gauze of the area, mesh and weight described by Michie, the test on 100 cu. cm of oil as suggested would represent about four years' actual service. The use of oxygen or ozone, instead of air, as an oxidizing medium might be permitted in order to quicken the rate of oxidation, and tests could be carried out which would indicate the increase in the rate to be expected compared with air alone. Fig. 2 illustrates graphically the formation of sludge at 130 deg. C. and 150 deg. C. produced by blowing air for forty-five hours through different kinds of oils, as tested by Michie. If these tests were carried out at more than two temperatures, it would be possible to obtain diagrams which would illustrate very clearly at which temperatures sludge formation would commence to take place. This point seems to be of great importance, because if the actual curves are as indicated this would be a strong point in favor of laboratory tests being made at considerably lower temperatures than those used by Michie. From Fig. 2 it would appear that the oil E, which gave the greatest amount of sludge at 150 deg. C., is for practical purposes probably better than the oils C, D and

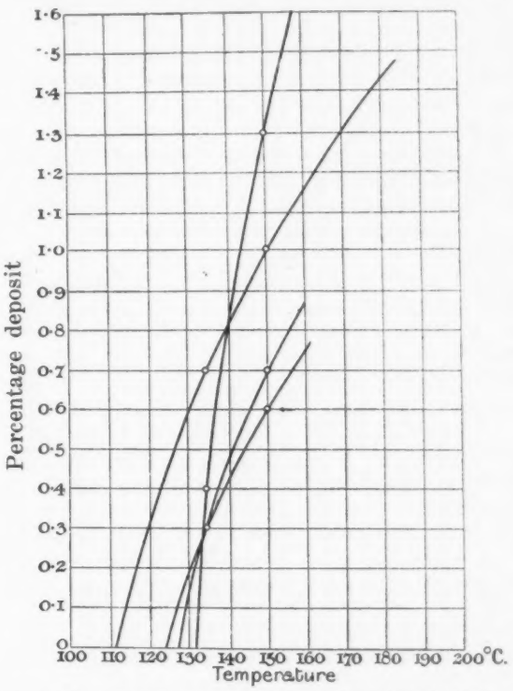


FIG. 2—CURVES SHOWING SLUDGE FORMATION

F, but if no tests had been made at 135 deg. C. the oil E would undoubtedly have received the worst character. Before sludge is produced the oil darkens considerably in color, which, if measured by a tintometer, could possibly be used as a help to compare the oxidizing effect on various oils. From a few experiments it would appear that transformer oils heated to high temperatures do not produce sludge if the air is prevented from coming in contact with the oil, and it also seems probable that blowing carbonic acid, nitrogen or other inert gases through the oil has no apparent effect. These experiments should be carefully carried out, because if the formation of sludge is found to be due entirely or mainly to oxidation it would seem desirable that transformers should be re-designed with a view to excluding air, sealing the cases hermetically and possibly introducing an inert gas over the free surface of the oil. The author of the report suggests that in this test definite areas should be standardized for the exposed surface and for the copper foil. He also suggests that the Thomsen test should be so modified that, while accepting a lower test temperature than is used by Michie (taking instead 60 per cent of the flash point of the oil), the test should be conducted in a 110-cu. cm flask with a long neck but con-

taining copper foil of a total area of 400 sq. cm. The oxidizing effect due to contact with the atmosphere will then be negligible, but there should be a suitable rate of air flow—say, 2 liters per hour—definitely standardized. The second part of the report deals with the absorption of moisture. If electrical tests are favored rather than chemical standards, a satisfactory minimum requirement as to what constitutes a dry oil at 15 deg. C. would be defined by a specific resistance of not less than 2,000,000 megohms per cubic centimeter and a dielectric strength of not less than 10,000 volts between a needle-point and a disk 0.5 in. in diameter, the disk and needle-point being 100 mils apart. An oil passing this test will not show any signs of moisture if tested by any of the usual chemical methods. Methods of measuring dielectric strength and specific resistance are then taken up, and the opinion is expressed that the needle-point and disk are preferable as electrodes. Thermal transference and the results of an arc in oil are finally discussed.—*Journal* Institution of Electrical Engineers (London), Jan. 1, 1915.

High-Voltage Dangers in Transformers.—J. LINDLEY THOMPSON AND S. AUSTEN STIGANT.—The conclusion of their illustrated article on high-voltage dangers present in static transformers due to electrostatic capacity of the windings. The authors conclude that to safeguard against the accumulation of excessively high electrostatic potentials on the low-pressure windings, and consequent danger to insulation, it is necessary to earth either solidly the low-pressure mid-point or one of the low-pressure terminals, or through a multiple spark-gap or static earthing device. The advantage, chiefly on account of human safety, apart from the reduction of stresses in the insulation, lies, in the authors' opinion, with the static earthing device, since this apparatus causes an earth only when high static potentials exist and not during normal operations. The danger to the human element if it should accidentally come into contact with the low-pressure winding is much less than if a solid earth were existent, causing a definite voltage always to be maintained above earth, particularly if the earthed point was one terminal of the low-pressure winding.—London *Elec. Review*, Jan. 1 and 8, 1915.

Lamps and Lighting

Rating Incandescent Lamps.—H. ARMAGNAT.—The article points out that with the advent of the metallic-filament lamp the rating of these lamps has become very arbitrary. Formerly with a carbon lamp the ratio of maximum candle-power in one direction to mean candle-power had a nearly constant value, but with the great variety of arrangements of the metallic-filament this is no longer the case. A solution of the difficulty would be to rate all lamps according to the mean spherical candle-power, but there is no photometer now available which permits one to determine the mean spherical candle-power by a single reading with the same facility as the mean horizontal candle-power.—*La Revue Elec.*, Vol. 22, No. 259, "Oct. 2, 1914 (published Jan. 1, 1915)."

Replacement of Arc Lamps by Half-Watt Tungsten Lamps.—A. BOJE.—The author first discusses the results obtained with more than 200 different arc lamps installed in the distribution system of the city of Stettin in Germany. They included arc lamps with pure carbon electrodes connected in sets of two, sets of four and sets of five, and also flaming-arc lamps. The author also determined under identical conditions the illumination obtained with half-watt tungsten lamps. The main result is that by the substitution of half-watt tungsten lamps for arc lamps not only was the illumination improved but quite a considerable saving was obtained. In the present instalment figures are given for lighting bridges in Stettin.—*Elek. Zeit.*, Jan. 7, 1915.

Generation, Transmission and Distribution

French Power Station.—T. POUSERT.—The railroad line from Villefranche to Bourg-Madame, which forms part of the Chemins de fer du Midi, is operated by direct-current energy at 850 volts from substations which are fed with 20,000-volt, three-phase energy from the 6000-hp water-power station of La Cassagne. For the operation of the line from Perpignan to Villefranche the single-phase system will be used and energy will be supplied from a new water-power station at Fontpédrouse. The hydroelectric development is described. There are to be two generator sets, each consisting of a 2200-hp turbine coupled to a 1375-kva single-phase alternator. The emf is 13,500 volts and the frequency sixteen and three-fifth cycles per second. Since the plant contains no transformer, coils of high self-induction are installed at the starting point of the line in order to protect the alternators against dangerously high voltages from traveling waves.—*La Revue Elec.*, Vol. 22, No. 259, "Oct. 2, 1914 (published Jan. 1, 1915)."

Coal.—P. S. THOMPSON.—A paper read before the Newcastle Section of the (British) Institution of Electrical Engineers on coal and its economical use. After a brief introduction on by-products obtainable from coal, the author discusses the use of coal as a fuel, the selection and testing of coal, the characteristics of bituminous coal, principles of combustion, control of combustion in the furnace, heat losses, and boiler efficiency as affected by variation of the carbon-dioxide percentage and the final temperature of the exit gases. An account of the discussion which followed is also given.—*Journal* Institution of Electrical Engineers (London), Jan. 15, 1915.

Formula for the Windage of Flywheels.—E. BUCKINGHAM.—The author first discusses critically the formula by Becker and a more general one and gives a third one of his own which he considers preferable. It is as follows: $P = 10^{-13}\, n^3 D^5 \quad [1.45 + 742\ (B/D)^2]$ where P = the windage in English horse-power, n = the speed in revolutions per minute, D = the diameter in inches, B = the width of the rim in inches.—London *Electrician*, Jan. 15, 1915.

Motor Drive on Warships.—An article giving the practice and experiences of the American navy with respect to electric driving. The hydraulic system with the use of electric pumps for putting water under pressure is preferred.—*Elek. Zeit.*, Jan. 7, 1915.

Steam Piping.—A. LANGSTAFF JOHNSTON, JR.—An illustrated article on heat losses and economical design of steam piping.—*Engineering Magazine*, February, 1915.

Traction

London.—A long abstract of last year's financial statement of the London County Council Tramways.—London *Electrician*, Jan. 15, 1915.

Installations, Systems and Appliances

Liverpool.—Continuation and conclusion of the illustrated article on the recent extensions at the Lister Drive station in Liverpool. The new steam turbine is designed for a normal continuous full-load output of 6000 kw at 1500 r.p.m., with steam at 200 lb. per square inch, superheated 200 deg. Fahr. and exhausting into a vacuum of 28 in. (barometer 30 in.), this vacuum being measured at the exhaust branch of the turbine. The alternator is of the three-phase revolving-field type and is designed to give a normal full-load output of 7500 kva at 80 per cent power-factor, 6600 volts, the frequency being fifty cycles per second. The condensing plant is of the Mirlees-Watson type and is capable of dealing with 88,000 lb. of exhaust steam per hour and maintaining a vacuum at the turbine exhaust branch of 28 in.

(barometer 30 in.) when applied with 11,000 gal. of cooling water per minute at a temperature of 80 deg. Fahr. The condenser is of special design and contains 14,000 sq. ft. of cooling surface.—London *Electrician*, Dec. 25, 1914, and Jan. 1, 1915.

"Denatured" Electric Current.—G. PINCHERLE.—An illustrated description of an Italian device due to Professor Arno by which a heating circuit is made useless for lighting. A lighting attachment is rendered inoperative on a circuit intended for heating or power purposes. The method employed depends upon the fact that heating and power appliances will continue in operation for brief intervals without any supply of energy, while electric lighting is entirely inadequate unless the supply of energy is continuous, lamps being incapable of storing energy. Based upon this principle, circuits which are intended for heating are connected through the usual form of watt-hour meter and then through an interrupter which periodically opens the circuit. By experiment it has been found that by an interruption of two seconds, at intervals of twenty seconds, lighting is absolutely intolerable while heating devices are practically unaffected. The contact device is made up of metallic, carbon or mercury contacts, or any combination of the three. The period may be maintained by clock-work connected indirectly to the interrupter or at a distance and acting as a master clock to a number of interrupters. It has also been found practicable to utilize the expansion from heat for interrupting the circuit periodically, and such an apparatus could be made at very low price. For large installations the interrupter should be motor-driven. Tests extending over a period of two months on four different types of interrupter have demonstrated the practicability of the system. The thermal interrupter proved to be the most efficient, having a loss so small as to be absolutely negligible (not more than an ordinary ammeter or voltmeter).—From *L'Industria-Rivista Tecnica* (translated in abstract in the *Engineering Magazine*, February, 1915).

Tariffs for Electrical Energy.—A brief article, in reply to a former one by C. S. Reid, on theories of electric rate schedules.—*Engineering Magazine*, February, 1915.

Units, Measurements and Instruments

Instrument Factory.—An illustrated description of the works of the Cambridge Scientific Instrument Company, Ltd., which have recently been extended.—London *Electrician*, Jan. 15, 1915.

Wires, Wiring and Conduits

Transmission-Line Calculator.—ROBERT W. ADAMS.—The transmission-line calculator described in this article was developed to simplify the calculation of the voltage drop and power loss in alternating-current transmission lines. The author condenses the preliminary work necessary for a graphic solution of vector diagrams and then explains how, by means of the curve and charts, the succeeding steps necessary to a complete solution of the problem are arrived at.—*Gen. Elec. Review*, Jan. 15, 1915.

Insulation.—B. G. LAMME.—An article on some practical insulation problems. The effect of temperature on electrical insulation is first discussed, with reference to the chief insulating materials in commercial use. It is then pointed out that insulating materials also serve another purpose, namely, to shield the conducting or live parts of the machines from other foreign conducting materials, such as dirt, grease, oil, water, etc. Troubles arising from these causes are then discussed, especially troubles from water or oil getting into the insulation. The drying out of coils is finally dealt with.—*Elec. Journal*, January, 1915.

Electrophysics and Magnetism

Permanent Magnetism of Chrome and Tungsten Steels.—MARGARET B. MOIR.—The author has investigated the permanent magnetic properties of certain chrome and tungsten steels. The magnets are subjected to repeated mechanical shocks and alternate heating and cooling, and the loss of residual magnetism during and after these and other "maturing" processes is examined. A comparison is made between the different steels used in the experiments. Four tungsten steels were tested containing 3, 6, 8 and 12 per cent tungsten respectively. Though none of these specimens is so satisfactory from the point of view of permanency as the chrome-steel magnets containing 8 per cent chromium and upward, they are all, even after being submitted to shock and change of temperature, much superior in magnetic intensity to even the best of the chrome steels. The most striking thing about the results obtained for the four tungsten steels is, however, the extraordinary similarity between them. It seems very remarkable that when quenched at 900 deg. C. a specimen containing as much as 8.72 per cent tungsten should be hardly superior to one containing only 2.88 per cent, while one containing 11.65 per cent is actually inferior. When a tungsten steel is quenched from 900 deg. C no advantage is gained either in intensity or permanence of magnetism by increasing the percentage of tungsten.—London *Electrician*, Dec. 25, 1914. The complete paper is published in *Philosophical Magazine*, November, 1914.

Zeeman Effect.—H. R. WOOLTJER.—A contribution to the problem whether the temperature has an influence on the Zeeman effect. Wood and Zeeman's method of obtaining fine absorption lines for investigations in a strong magnetic field is used for the comparison of the magnetic resolution of the *D* lines at low temperatures (vacuum tube at 300 deg. C.) and at higher temperatures (the temperature of the oxy-acetylene flame and the electric spark). The amplitude of the resolution is the same at all temperatures within the limits of error. But in the ratio of intensities of the external and internal rectangular components of *D* there seems to be a difference.—*Phys. Zeit.*, Dec. 1, 1914.

Telegraphy, Telephony and Signals

Wireless Telegraphy.—W. DUDDELL.—A discussion of the proposed work to be undertaken by the International Commission on Wireless Telegraphy. At the sending station it is necessary to measure the antenna current, which requires ammeters suitable for high frequencies and strong currents up to 150 amp at least. Hot-wire instruments must be used. The author proposed the arrangement shown in Fig. 3. It consists of two copper tubes, on each of which a series of notches is made. A thin wire passes in zigzag fashion from one notch to another, as shown in the illustration, so as to form a kind of squirrel cage. The two tubular electrodes are given a rotatory movement with regard to

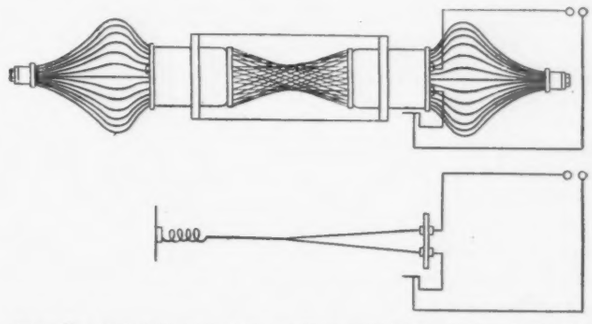


FIG. 3—DEVICE FOR MEASURING CURRENT IN ANTENNA

one another, causing the wires to fall on the surface of a hyperboloid of revolution. Two wires are stretched along the axis of the hyperboloid and joined together in such a way that the weld (giving a thermocouple) is at the central part of the narrowing or contraction. These wires are taken to a millivoltmeter. With an instrument of this kind, an emf of 5 millivolts is obtained when a current of 150 amp passes. In order to obtain results quickly and satisfactorily, it is necessary to place the cold junction of the thermo-electro couple in the neighborhood of one of the tubular electrodes. The author then discusses the measurement of the damping of the antenna at the sending station. The nature of the antenna to be used at the control station requires very careful consideration, in order that changes, for instance, in the earth may not affect the accuracy of the results. Probably Lodge's type of antenna, as shown in Fig. 4, is best. On the other hand, it might be well to see whether a receiver with closed circuit, such as has been described by F. Braun, might not be better. Among its other advantages is the fact

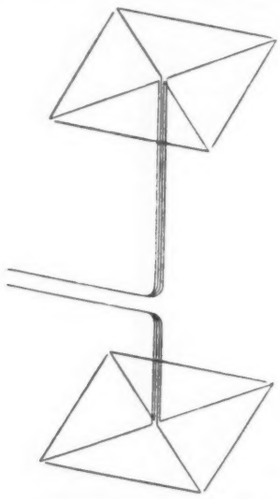


FIG. 4—LODGE'S ANTENNA

that the properties of the circuit could be defined very exactly and kept constant. At the different receiving stations it is necessary to determine the strength of the signals that are received, partly with a view to comparing results from day to day and partly to compare the results which are obtained at the different stations on the surface of the earth. The author proposes that the commission should approve of the following course of action. The first point would be to see whether it is possible to standardize existing antennas in such a way as to obtain comparable results, or whether on the other hand it is necessary to construct special antennas for the purpose. It is thus of importance to have a standard method of measurement or an instrument, which need not be very sensitive, with which the others could be compared. A closed or nearly closed radiating circuit must also be designed, capable of radiating definite quantities of energy of different wavelengths. A closed or nearly closed receiving circuit must be had, which can be used in connection with the standard measuring apparatus, so as to determine the radiation of the circuit.—London *Electrician*, Jan. 8 and 15, 1915.

Miscellaneous

British Patents.—A list of British patents of interest to electrical engineers which will expire during 1915, the term of their life having been reached.—London *Electrician*, Jan. 1, 1915.

Book Reviews

GRAPHICAL DETERMINATION OF SAGS AND STRESSES FOR OVERHEAD LINE CONSTRUCTION. By Guido Semenza and Marco Semenza. Translated from the Italian by C. O. Mailloux. New York: McGraw-Hill Book Company, Inc. 24 pages, 13 charts. Price, $3.

Ever since electrical engineers have adopted tower construction for supporting their overhead transmission lines they have demanded that these lines should be installed by carefully prepared engineering methods, as distinguished from careless guesswork. The volume before us represents the results of careful investigation, guided by experience, in producing a series of curve sheets from which either the proper sag or the proper tension can be found by direct inspection for any given case of line installation. The charts are very practical and well adapted to engineering needs. They have been converted from the metric system of the original Italian to the English measures of American usage, and from Centigrade to Fahrenheit temperatures. It is doubtful whether this has not been an unnecessary labor. Most electrical engineers of recent graduation know more about the metric system than English measures and are more accustomed to Centigrade than to Fahrenheit scales of temperature. Moreover, there is more chance of miscalculation in using English than in using metric quantities. However, the book is a very valuable asset to the overhead-line constructor. The skill and accuracy of the translator in dealing with technical Italian are well known. Both the original authors and the translator are to be complimented upon the work.

TECHNICAL MECHANICS. Statics and Dynamics. By Prof. Edward R. Maurer. New York: John Wiley & Sons, Inc. 356 pages, 547 illus. Price, $2.50.

This is the third edition of Professor Maurer's book, the title of which has been so worded as to distinguish it from both theoretical and applied mechanics. The author claims that the book is not comparable with books bearing the other titles, but it is of little interest to compare identical things, and in this particular case the author denies his critics the privilege of making any comparisons, seeing that the title "Technical Mechanics" appears to be his particular monopoly. This title is not, however, ill chosen, because it will be found that almost every subject treated has an important bearing on some aspect of engineering. The fact that the book has been used during the past ten years is in itself sufficient proof of its merit. This edition includes many changes, the result of experience in teaching the subject. These changes include a new collection of problems. The text has, in fact, been almost completely rewritten. The requirements in the matter of previous mathematical training are not very severe, but a sound knowledge of the elements of the calculus is necessary to the understanding of the chapters on dynamics. The different sections of the subject are taken up in the following order: Composition and resolution of forces; forces in equilibrium; simple structures; friction; center of gravity; suspended cables, etc; rectilinear motion; curvilinear motion; translation and rotation; work, energy, power; momentum and impulse; two-dimensional motion; three-dimensional motion; Appendix A, theory of dimensions of units; Appendix B, moment of inertia of plane areas. The problems are collected together at the end of the book. The diagrams and illustrations are numerous and very clear, only what is essential being shown—a matter of considerable importance in books dealing with fundamental principles.

POWER AND OPERATING SECTION

Spray-Type Air Washers and Coolers for New York Station

Spray-type air washers and coolers are being installed in the generating station of the United Electric Light & Power Company, New York City, at the entrance to each of the three 15,000-kw generator ventilating ducts. Each unit is capable of handling 50,000 cu. ft. of air per minute and under full load, it has been reported, will remove 98 per cent of the dust and cool the air to the wet-bulb temperature of the air entering the washer. For their duty the units are very compact, having an over-all length of 17.5 ft. arranged end to end, a height of 4 ft. and a depth of 6 ft.

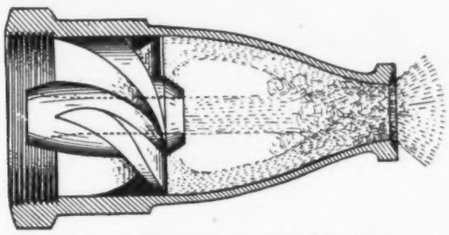


FIG. 1—SECTION OF SPRAY NOZZLE

The principal reason for employing the washers is to remove brick dust, which is quite prevalent in the air around the station, there being a brick factory close by. If the air was not purified, the ventilating ducts through the generator windings would soon clog up unless the passageways were blown out frequently, and the machine might overheat or even burn up. In some plants deposits of dust became so saturated with oil that they caked into a solid mass which could be removed only with a chisel.

Another advantage which will be obtained from the air cooler will be the ability to operate the generators at a higher rating in hot or even in moderate weather. The extent to which air cooling will increase the generator ratings can be shown by considering actual conditions which existed on the hottest day in New York last year. The temperature as given by the United States Weather Bureau was 95 deg., the relative humidity 42 per cent and the corresponding wet-bulb temperature 76 deg. With a cooling-air temperature of 95 deg. a generator can carry only 79 per cent of rated load, whereas if the air temperature is 77 deg. the machine could carry full rated load. Hence the output can be increased 26.6 per cent under similar conditions without extra generating equipment, as the air cooler will lower the temperature to within 1 deg. of the wet bulb.

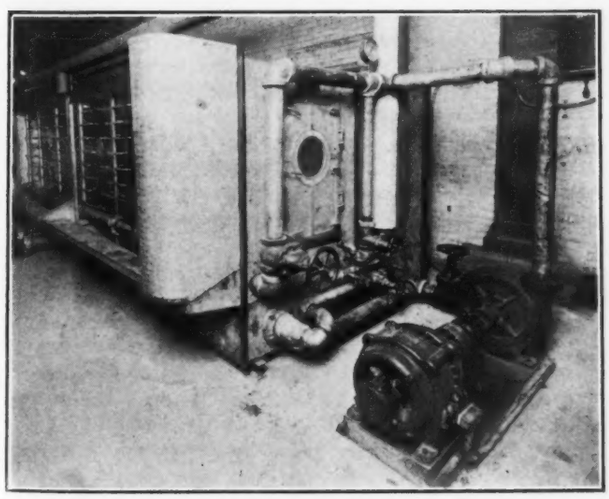


FIG. 2—ONE OF THE WASHERS FOR A 15,000-KW MACHINE

Cross-sections of a washer and cooler unit are shown herewith. Air enters the apparatus as shown by arrows and in passing through the first compartment is subjected to a fine dense mist of water by the atomizer sprays, which are equipped with diffusing screens. The air-propelling sprays which are installed between the atomizers assist in driving the air through the cooler. The efficiency of the apparatus is declared to depend almost entirely on the nozzles used. Because of their design these nozzles will produce a solid conical spray instead of a hollow one.

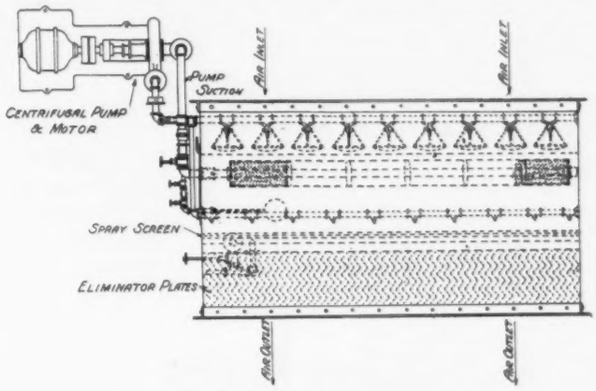


FIG. 3—PLAN OF WASHER

Across the compartment in front of the nozzles is a wire screen which breaks the spray and causes the water to drop in a sheet across the air current. Back of the screen are baffles which separate the water from the air. The nozzles are made of bronze, the screen of brass and the baffles of aluminum. The water which drops into the bottom of the washer is withdrawn by a centrifugal pump and recirculated through the nozzles. Mud can be drawn off periodically from the settling basin. Unassisted by a ventilating fan, the water jets alone will force air through the washer. The normal rate of air flow is 720 linear ft. per minute, but purification and cooling can be effected with the air passing as fast as 1050 ft. per minute.

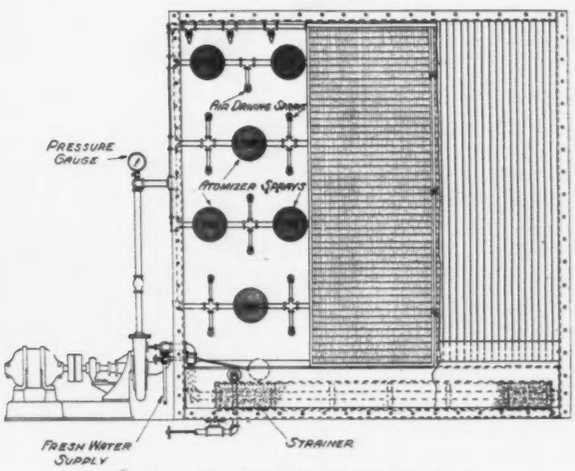


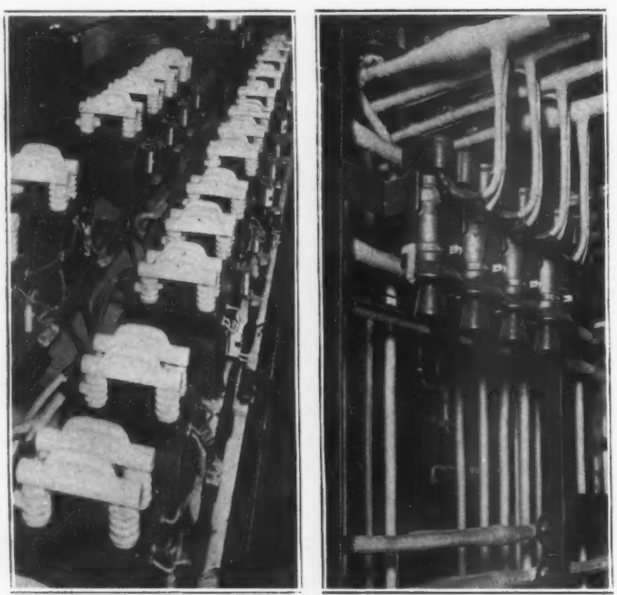
FIG. 4—THREE-SECTION ELEVATION

In practice the sprays are never started until the machine which is to be cooled has warmed up, hence water will never condense on the insulation as it will always be hotter than the saturated cooling air. Some manufacturers of electrical apparatus have even thought of advocating injecting a mist of water into cooling air to assist in carrying away heat.

To obtain purified air and still prevent water freezing in the washers during the winter, part of the warm air withdrawn from the station will be by-passed into the air-supply duct. The washer and cooler equipment is being furnished by the Spray Engineering Company, Boston.

Brooklyn Company Employs Porcelain-Clad High-Tension Fuses

The Edison Electric Illuminating Company of Brooklyn, N. Y., is employing the Metropolitan Engineering Company's porcelain-clad high-tension fuses, which it has found very satisfactory because they do not endanger persons near by when an overload occurs and because the units can be readily replaced by hand. Two



FIGS. 1 AND 2—6600-VOLT PORCELAIN-CLAD FUSES AND 2400-VOLT PLUG-TYPE FUSES

types are used, both of which are entirely inclosed, those used on 6600-volt potential transformers consisting of a porcelain inclosing tube with plug contacts at right angles to each end. On the 2400-volt circuits plug-type fuses are employed. These units are provided with porcelain handles and inclosed fuses which can be inserted in a receptacle without any danger to the person installing them. Tests have been made on the 6600-volt fuses by connecting them directly across a 400-kw generator's step-up transformer. While the amount of energy which must have been dissipated in the fuse was considerable, it is declared that there was no outward demonstration of the fact and that the porcelain was not visibly injured by the short-circuit. On opening a burned-out fuse it was found that the arc-extinguishing powder was only slightly discolored. These fuses have been employed for about a year and a half and during that time are reported to have given complete satisfaction. The accompanying illustrations show potential transformers equipped with the 6600-volt fuses and a rear view of a 2400-volt switchboard where the other type are installed.

Sulphur in Coal

Sulphur is not often found in a free state in coal; that is, it does not usually exist uncombined with other substances. Instead, it commonly occurs in chemical combination with iron and calcium, in the form of iron pyrites, sulphate of iron and calcium sulphate, the last named being known familiarly as gypsum. Iron pyrites, which is a disulphide of iron, is a mineral that has a brilliant luster and a pale brass-yellow color, the latter characteristic giving it the name of fool's gold. It is extremely heavy, its specific gravity being about 5, and its structure is crystalline. It may be present in the coal in scattered masses, or it may form partings along the cleavage planes. Calcium sulphate, or gypsum, shows as small white flakes. Of the two compounds, the one more commonly found in coal is pyrite. Still another form of sulphur that is found in coal is organic sulphur, which is a compound of sulphur and carbon, or of sulphur, carbon and hydrogen.

When the fuel is burned in the boiler furnace a temperature of from 2000 deg. to 2500 deg. Fahr. is produced. At a temperature about half as great as this, the iron pyrites is changed from a disulphide to ferrous sulphide, the heat breaking up the compound FeS_2 into FeS and S. In other words, from every molecule of pyrite one atom of sulphur is freed. This free sulphur then burns, taking up a part of the oxygen entering in the air and forming sulphur dioxide. The burning of this sulphur does not add greatly to the heat value of the coal, for the simple reason that the calorific value of a pound of sulphur is only 4000 lb.-Fahr. heat units. And as only half of the sulphur is set free, the increase of heat value is small.

If the sulphur exists as sulphate of iron or calcium, it possesses no heat value. Instead, a part of the heat of combustion is used in breaking up the sulphate, or decomposing it, and this heat is not subsequently restored by the burning or recombination of the substances formed during the decomposition. From a thermal standpoint, therefore, a fuel containing sulphur has little to recommend it.

On the other hand, the presence of sulphur is a positive detriment in various ways. For example, one effect of it is to cause rapid deterioration of the grate bars, particularly with coal that clinkers badly. A grade of coal that produces much clinker usually has a small percentage of ash in proportion to the percentage of sulphur. Under the effect of heat, the ash and the pyrite are melted together, and the resulting slag runs into the air spaces in the grate, hardens and forms clinker, and prevents air from passing up freely through the grate.

Now, one of the functions performed by the supply of cool air that enters the ash-pit is the cooling of the grate. As the air rises through the air spaces it comes in contact with the metal and is heated, the metal at the same time losing heat at an equal rate. This serves a doubly desirable purpose, as the air supply is preheated and the grates are prevented from being overheated.

When much slag and clinker are formed, however, and the air spaces become choked, the restriction of the air supply causes this cooling to be reduced or even eliminated at parts of the grate, and the heat is conducted into the metal of the grate, increasing until the bars or sections are warped or twisted. This action is accelerated by the presence of sulphur in the fuel. Sulphur has a strong affinity for iron, and under the effect of the high temperature the sulphur combines with the iron of the grate, making the metal soft. The molten slag produced by fusion of the impurities in the coal runs down on the softened metal and cuts it away, so that in a short time a grate may be ruined by the combined action of slag and sulphur.

The sulphur dioxide formed by the combustion of free sulphur or organic sulphur in coal has been blamed for the corrosion of boiler plates and tubes. It is true that the dioxide, when brought into contact with water, will form sulphurous acid, which may take up more oxygen and become sulphuric acid. Either of these acids will attack iron and produce corrosion. But the point to be observed is that the sulphur dioxide exists as a gas, at a temperature equal to or greater than that of the gases in the chimney. At such a temperature water would be vaporized; hence it is difficult to see in just what way an acid could be formed during the normal working of the boiler.

In addition to the formation of sulphur dioxide, oxide of iron may be produced by the effect of heat and oxygen on the pyrite. The iron oxide thus formed may possibly combine with other substances contained in the ash of the coal and produce clinker. Alone the oxide would have no such effect; but as the coal contains silicious materials, the oxide unites with these, forming easily fusible compounds. The heat of the furnace thus produces slag, which cools and becomes clinker. So, while the silica and the oxide separately would not be affected by the heat of the furnace, together they may form clinker, and the greater the furnace temperature, the more likelihood is there of clinker.

This explains why trouble with clinker must so frequently be guarded against in plants using low-grade fuels. Such fuel contains a large percentage of ash and is burned with strong draft. The rate of combustion is high and the temperature is likewise great, so that the conditions are favorable to the production of clinker. Such trouble has been overcome in many cases by using a jet of steam below the grate. The steam, in passing upward through the fuel bed, is decomposed, and the heat required to break it up is apparently sufficient to keep down the temperature of the grate and the clinker to such a point that the latter is not fused on the grate.

The ferrous sulphide that remains after a part of the sulphur has been driven off from the pyrite may cause the formation of clinker. The fusing point of this compound is comparatively low, and if the pyrite occurs in masses in the coal, it is probable that the ferrous sulphide will be fused before it can burn. The fused material thus becomes the start for the formation of clinker.

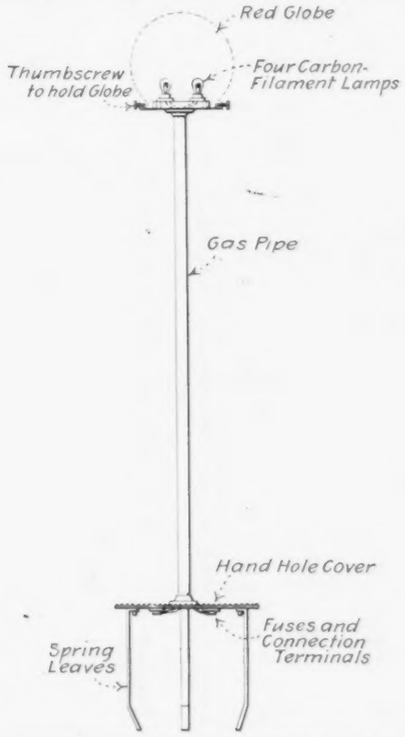
It is not safe to put the blame for clinker wholly on the sulphur content of coal, nor is it wise to conclude that the danger of clinker increases as the sulphur content increases. Free sulphur and organic sulphur will not cause clinker, and pyrite will change to ferrous sulphide and sulphur dioxide; but if silicates are present with the pyrite, it is probable clinkering will occur. In any case it is unwise to condemn a grade of coal merely because the analysis shows a high percentage of sulphur. The state in which the sulphur exists in the fuel should be determined, as well as the nature and distribution of the other minerals. From these facts a better idea can be obtained as to whether the coal will clinker when burned. The relative amounts of iron, sulphur, lime, silica, etc., and the rate of combustion of the fuel are the factors on which the formation of clinker depends.

Again, sulphur has been blamed for aiding the spontaneous combustion of stored coal. Although there is no conclusive proof that it has no part in the production of spontaneous combustion, yet the investigations that have been made indicate that its effect is negligible. Spontaneous combustion is a slow process of oxidation occurring where there is enough air to support oxidation but not enough to carry away all the heat generated. Now, if sulphur is the cause of spontaneous combustion, it must be present in the coal in an oxidizable form. As iron sulphate or calcium sulphate it cannot possibly undergo oxidation. Yet tests of coal taken from places where spontaneous combustion has occurred show that less than one-fourth of the total sulphur has been changed by the oxidation. If sulphur is regarded as the cause of this action, or even as an influential factor, it would seem that a greater proportion would be active.

In the United States the coals that contain the greatest percentages of sulphur are those from Ohio, Indiana, Illinois, Iowa, Kansas and Missouri. They contain from 3 to 6 per cent, with an average of about 4 per cent.

Temporary Isle-of-Safety Lamps for Chicago Boulevards

When a nocturnal joy rider drives his automobile into one of the lamp-posts provided as traffic guides at crossings on Chicago boulevards the lighting standard is usually more nearly completely demolished than is the reckless driver's car. Furthermore, the "isle of safety," which was formerly a secure refuge for the dodging pedestrian, becomes now a dangerous unlighted block of concrete and stone, a menace in the pathway of the careful and the careless alike.



TEMPORARY ISLAND-OF-SAFETY LAMP

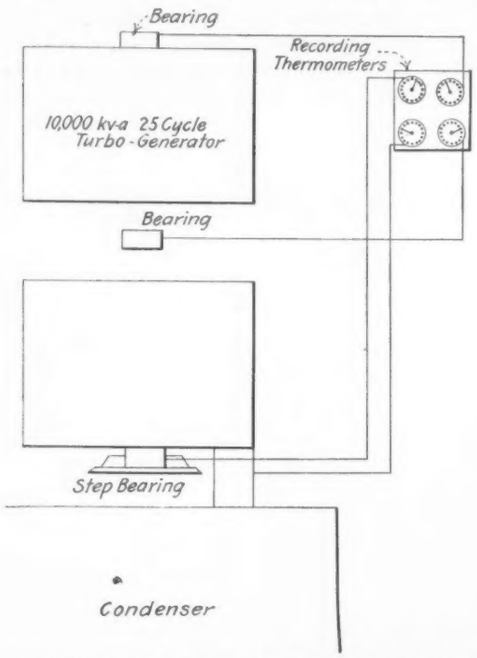
To relieve dangerous conditions caused by such accidents the trouble-men on duty at the Lincoln Park headquarters keep available temporary lamp standards which are designed for speedily replacing the damaged danger signals. The temporary units are simple in construction and easy to install. An upright piece of pipe forms the standard. At the lower end a hand-hole cover is fastened to the pipe, and spring leaves attached to the cover are set in such positions that when they are forced into the hand-hole they will sustain the lamp standard upright. Connection terminals underneath the hand-hole cover provide a convenient method of joining the damaged circuit to the temporary lamps, which are supplied with energy by means of circuits running through the upright pipe. The wiring of the

temporary standard is arranged so that the four lamps may be operated from one circuit or from two circuits, if the latter number is available.

Mr. Claude H. Shepherd, engineer for the Chicago Lincoln Park Commissioners, in speaking of the rapid work by trouble-men in installing these temporary units, recently said that with the automobile conveyances which the men use in such emergencies an isle-of-safety lamp can be replaced anywhere on the boulevard system in thirty minutes.

Automatic Temperature Records at Kansas City

Mr. John Fritz, chief engineer of the Metropolitan Street Railway Company, Kansas City, Mo., is an ardent advocate of automatic recording devices in the power station. The accompanying sketch shows how four recording thermometers have been connected to the three bearings and to the condenser connection of a 10,000-kva vertical turbine. The instruments are of a type which requires attention only once in each seven days, and Mr. Fritz says that the records of bearing temperatures and vacuum obtained in this manner are much more accurate than those kept by the station attendants.



CONNECTIONS BETWEEN THERMOMETERS AND BEARINGS

Pipe Thawing

BY CHARLES E. BECKWITH

In the past two years numerous articles have appeared in the ELECTRICAL WORLD on the subject of thawing water pipes with electricity. In all cases where transformers were used the primary was connected to its rated voltage, and a choke coil or rheostat was used in series with the secondary to hold the current within a reasonable load limit.

This method entails a large waste of energy which would not be necessary were the same amperage at command with just sufficient voltage to force it through the pipe to be thawed.

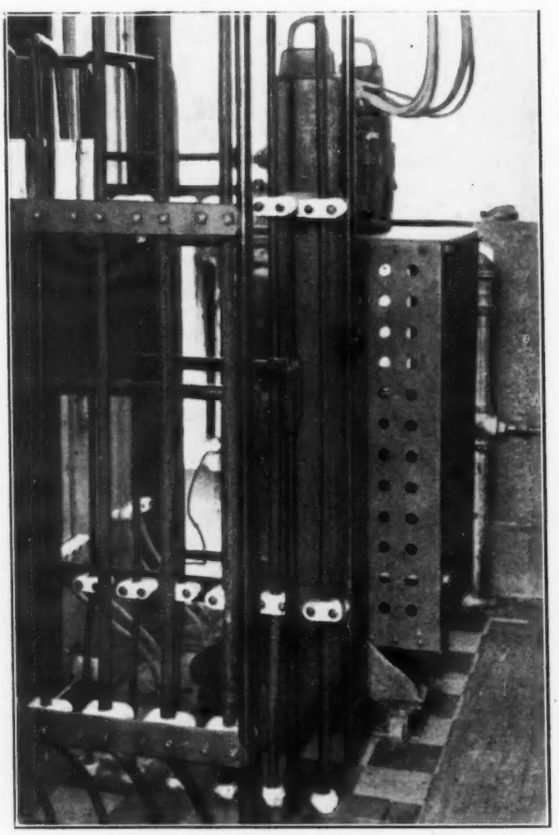
At first thought it might seem impossible to obtain the desired results without a special transformer, and for this reason, no doubt, the method has not been tried.

The writer, who had occasion recently to do some pipe thawing, experimented with low voltage obtained in the following way: A 1100 or 2200-volt to 110 or 220-volt transformer of the proper size was used with the secondary windings connected in multiple and the primary windings in series and subjected to 220 volts. This arrangement gave 11 volts on the secondary. The secondary of the transformer was connected to the pipe to be thawed in the usual manner, but without choke coil or rheostat. In most cases 11 volts is sufficient to do the work, but in case it is not the primary windings may be connected in multiple to give 22 volts for the thawing circuit. There appears to be no reason why better results cannot be obtained by this method than by the old one. A 220-volt feeder is generally accessible in many parts of a residential district where 2200 volts is not. The danger factor ever present in making 2200-volt connections is eliminated by using 220 as the primary voltage.

While I have had an opportunity to try the above plan in only a small way, the results have been very satisfactory, and I believe they would be equally so on any scale.

Portable Rectifier in Factory Substation

To enable the rectifier illustrated in the accompanying halftone to be removed quickly from an adjacent factory substation in case of trouble, the apparatus has been mounted on a frame carried on 1¾-in. diameter rollers. Extension rods sectionalized and provided with set screws enable the charging current to be adjusted from the front of the switchboard panel, and the leads to the rectifier can be readily disconnected from the circuit wires just above the apparatus. The clearance behind the switchboard was made large enough to handle the equipment with facility in emergencies.



PORTABLE RECTIFIER IN FACTORY SUBSTATION

COMMERCIAL SECTION

Delivery of Bills by Messenger and the New Mail-Box Law

A recent order of the Post Office Department that all boxes and receptacles installed in apartment houses, dwellings and other buildings, and along rural delivery routes, for receiving individual addressees' mail shall be considered under the jurisdiction of the department in the same way as any other public mail-box has been interpreted in Chicago to mean that it will hereafter be illegal to deposit in such a box unstamped envelopes, bills, advertising matter, or material other than that received through the regular mails. Such boxes become a part of the post office establishment, and as such it is declared that persons depositing in them matter other than that properly addressed and sent through the mails may be subject to a fine of $1,000 and three years' imprisonment. According to Postmaster Campbell of Chicago, no official interpretation has yet been received in that city concerning this new postal law, which puts private mail boxes under the protection of the federal government, and he expressed his personal doubt that the rule would be applied as rigorously as it has been defined. Many electric-light companies have found it cheaper to have their bills delivered by messenger than to send them through the mails. The general auditor of one large central-station company said that his company would willingly comply with the law if this required that its messenger system be abolished and that bills be sent out by mail, but he expressed doubt that the Post Office Department would interfere with the delivery of bills directly to the householders or to the door-sills of its customers.

Half a Million Dollars to Rehabilitate Wiring at Chicago Stock Yards

About two years ago the bureau of electrical inspection of the city of Chicago notified authorities at the Union Stock Yards that the practice of stringing wires over the tops of buildings and other structures in "the yards" must be discontinued and that existing over-roof construction must be removed. In justifying its demands for these changes the inspection department cited the fact that firemen fighting conflagrations are afraid to mount roofs carrying electric wires, as it is impossible to

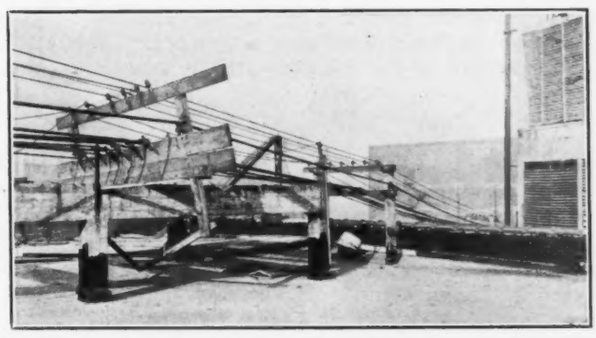


FIG. 1—WIRES OF SEVERAL POTENTIALS STRUNG OVER ROOFS

tell what voltage a given circuit may be carrying. The tracing of circuits to de-energize those in the danger zone is likewise an almost impossible task. Even firemen standing on the ground were said to be in danger from falling wires when the latter's supports burned away. It was also pointed out that the wiring as it existed represented an ever-present fire hazard.

Some of the stock yards firms had already admitted the justice of the inspection department's demands and had made changes, but it is only recently that all have agreed to place their wires underground. It is estimated that fully $500,000 will be required to complete this work.

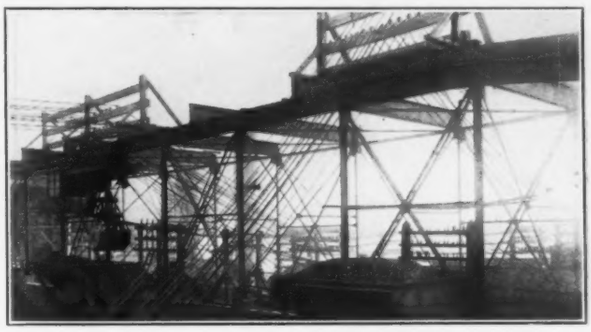


FIG. 2—OVERHEAD WIRING CONDITIONS IN STOCK YARDS

The nature of the changes to be made will vary widely, for while most of the stock yards industrial plants are provided with alternating-current equipment, others have 110-220-volt direct-current systems. Mr. Victor Tousley, chief electrical inspector of Chicago, estimates that the entire work of rehabilitation of the wiring in "the yards" will probably be completed within two years.

Central-Station Business Breaking Records at Providence

The Narragansett Electric Lighting Company, of Providence, R. I., has completed the best year in the history of the organization. Although the jewelry trade and some other manufactures have been depressed since earlier in the year, the sales department has more than offset any shrinkage in one quarter by new business secured elsewhere. During the first half of the year the motor load secured exceeded that for the entire year 1913, and the diversity of industries in the company's territory has been an important factor in the growth since the war began. Early in November an 800-hp contract involving the shutting down of three Corliss steam engines in the plant of the Davol Rubber Company was signed, and an electrically driven pumping installation for the city water-works at Pettoconsett is now ready for service. In the former plant three 200-hp induction motors wound for 2300-volt service and several smaller motors will be required, with an extensive improvement in the driving conditions. The contract with the city for pumping service requires the use of a 1300-hp synchronous motor driving a centrifugal pump on an off-peak schedule, the capacity of the pump being 30,000,000 gal. in twenty-four hours. This contract was secured after the city had planned to install a second steam-driven pump at Pettoconsett for auxiliary service in the summer at a total estimated cost of $150,000. The estimated cost of the electrical installation is about $50,000, and the city secures a rate of 8 mills per kw-hr. with a service charge of about $3,500 per year, approved by the Rhode Island Public Utilities Commission.

Not long ago a fleet of eight electric vehicles was purchased by the Outlet Company, one of the largest department stores in the city, through the co-operative efforts of the Narragansett company. This installation will supersede twenty-five horses and includes one 2-ton

freight truck, two 1-ton furniture delivery wagons, and five 1000-lb. delivery wagons. The freight truck will serve the company warehouse and railroad terminals. The larger delivery wagons are equipped each with sixty cells of Edison "A6" battery, a size ordinarily used on 2-ton trucks. It is expected that these furniture-hauling equipments will perform work similar to that of gasoline trucks owned by the Outlet Company, a 50-mile daily guarantee having been received. The fleet represents a total investment of about $25,000 and was supplied by the Commercial Truck Company of America. The batteries will be charged in a private garage of the owner on central-station service at an off-peak rate of about 8 mills per kw-hr. In connection with the equipment a motor-driven package bolt system will be installed to cut the cost of handling merchandise between the stock room and the trucks. Nine trucks and wagons will be eliminated as a result of this electric motor-car service. For the present the delivery wagons will be required to make about 500 deliveries per day within a radius of 5 miles from the store, while the furniture wagons will run out into the country probably 15 or 20 miles on occasion.

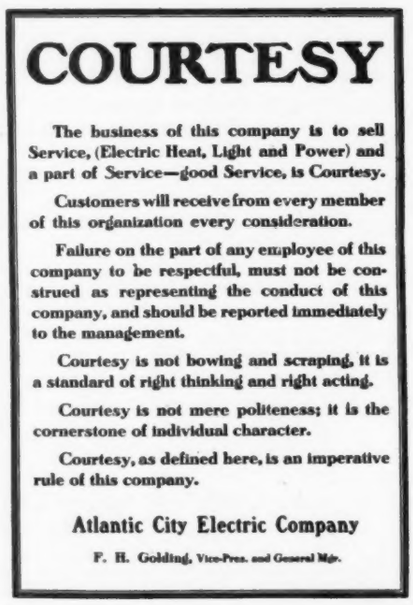
During "Edison anniversary week" the company sold over 21,760 tungsten lamps, compared with a normal sale of 2500. For this short period a reduction of 25 per cent below the list price was made. Last year the company sold 140,000 tungsten lamps, a gain of 40 per cent over 1913. The company purchased 1000 portable lamps last year and supplied free a 60-watt lamp for each outlet, the range in prices of portables displayed in the company's Electric Shop being from $2 to $150. These are sold on the basis of 20 per cent down and 10 per cent a month on the balance. For the holiday trade the company adopted the best ideas of department-store practice, billing appliances purchased for Christmas on Feb. 1 statements to customers, providing special Christmas boxes at a nominal increase in cost with Electric Shop seals and giving combination sets of appliances for the Christmas season only at 25 per cent below list price. Any three "Hotpoint" appliances, or two of these and a vacuum cleaner, were sold in this way, including in the former case one interchangeable cord and plug. Recognizing that many merchants raise prices at Christmas, the company made special effort to lower the cost of electrical appliances at that season. A special discount of 20 per cent was made on chafing-dishes and egg cookers. Flatirons were sold on the basis of nothing down and $1 a month, and a holder by which a flatiron can be reversed and used as a toaster or hot-plate was given with each purchase. The window display was changed every three days during the holiday season, with a central moving attraction constantly on exhibition. A Christmas circular was also sent to each of the company's 16,000 customers offering bargain prices on appliances, and advertisements were also run on the December bills. The sales in the Electric Shop were 108 per cent greater in October and 48 per cent greater in November than in the corresponding months of the preceding year.

Where to Begin to Cheapen Service

In a discussion before the Chicago Section of the American Institute of Electrical Engineers bearing on the small-customer problem, Mr. J. R. Cravath, Chicago, pointed out that the place to begin in making service cheaper is at the customer's installation. Assuming a customer's installation with four outlets equipped with two 25-watt and two 40-watt lamps, and taking the diversity factor as 18 per cent, it will be seen, said he, that the maximum demand which this customer's 130-watt installation will impose on the station and distributing system is 23 watts. It has been estimated that $340 per kw will cover the cost of a city lighting system, exclusive of meters and service wiring; therefore the customer with 23 watts maximum demand can be said to represent a plant investment of $8. The customer's installation—that is, the meter, wiring and service connection—costs, however, about $40, or five times as much as the plant investment necessary to serve him. Viewing the problem from this angle, Mr. Cravath declared that the present tendency to increase the cost of wiring in cities should be discouraged and all efforts striving to make service more inexpensive should begin at the customer's installation.

Courtesy Defined

In the most conspicuous places in the offices of the properties of the American Gas & Electric Company a poster similar to that shown in diminutive form herewith is displayed. The managers of the companies whose employees have read and are governed by these


COURTESY
The business of this company is to sell Service, (Electric Heat, Light and Power) and a part of Service—good Service, is Courtesy.
Customers will receive from every member of this organization every consideration.
Failure on the part of any employee of this company to be respectful, must not be construed as representing the conduct of this company, and should be reported immediately to the management.
Courtesy is not bowing and scraping, it is a standard of right thinking and right acting.
Courtesy is not mere politeness; it is the cornerstone of individual character.
Courtesy, as defined here, is an imperative rule of this company.
Atlantic City Electric Company
F. H. Golding, Vice-Pres. and General Mgr.

"COURTESY" POSTER OF A UTILITY COMPANY

rules hold the firm conviction that this definition of courtesy is the correct one. They also believe that when employees have gained a clear comprehension of this definition misunderstandings between the public and the employees of the company will be practically eliminated.

Each Guest Cooks His Own Dinner Electrically

One evening during the holiday season the new-business department of the Toledo Railways & Light Company gave a unique electrical banquet to the members of the department and to a few other electrical men. As the guests filed into the banquet hall all lights were turned low and each found his place by the light of small electric-sign letters which formed the initials of those present. The light was then turned on and the guests had another surprise, for at each place there was a three-way electric socket, and each man was provided with his own electric utility grille, electric cigar lighter, chafing-dish and coffee percolator. At each place was an individual steak, and at the sound of an electric gong the grilles were inverted and placed on the steaks. At another ring of the gong the steak

was turned, and at another the grille was taken off. The steaks were found to be beautifully done. Another ring from the gong was the signal for the guests to lift the cover of the chafing dishes, and there they found peas steaming hot. At one side of the room was an electric oven, from which baked potatoes were supplied to every table. Each man was served with electrically

AN INDIVIDUALLY COOKED DINNER

percolated coffee from his individual percolator. In fact, nothing edible was brought from the kitchen. Everything was cooked by the men themselves, and, as was stated by the company's genial publicity manager, Mr. E. R. Kelsey, "it served to show the guests the great utility of electric appliances and fairly startled them as they realized that the dreams of Jules Verne have at last become realities."

Making Good Use of "Lost Business" Reports

Speaking of the very satisfactory sale of electric appliances during the holiday season, Mr. Edward Quillan, new-business manager of the Alliance (Ohio) Gas & Power Company, said that while the company had not made any particularly vigorous advertising effort to increase Christmas sales, many electric appliances had been disposed of in December. The cumulative effect of the whole year's advertising, soliciting and missionary work, said he, was felt at this time. One idea used by the solicitors at Alliance, however, was rather unique and was considered very successful. Records had been kept during previous campaigns showing why prospective customers did not buy certain appliances. Of course, a large number of women had said that they liked electric vacuum cleaners, for instance, but could not purchase one at the time of the campaign because of lack of funds. Such reports gave the solicitors a chance to call upon the men of these households and suggest a vacuum cleaner as a Christmas gift. Many sales were made in this way, proving the "lost business" reports to be really of the greatest value.

Egg Production Increased by Electric Light

According to the testimony of Mrs. George C. Newell, of Brookfield, Ill., a suburb of Chicago, the effect of using artificial electric light in her chicken house to simulate the long days of summer has been the tripling of the egg output of her hens. In their tungsten-lighted compartments these estimable chickens now average 150 eggs per hen per year. A total of 18,000 eggs was produced in the Newell coops last year.

The increase in the productiveness of the hens has resulted, it is explained, from the duplication of summer lighting conditions during the dark days of winter. It was Mrs. Newell's theory that the hens did not lay many eggs during the winter months because they spent more time on their roosts and had less opportunity for scratching about for food. At a nominal cost the electric service of the Public Service Company of Northern Illinois was extended to the henhouse. Each of the two sections is provided with a 2-cp lamp and a 100-cp cluster.

At 6 a. m. on dark winter mornings when the family arises the lamps are switched on in the coops. At once the feathered occupants are roused to the day's activity of scratching for food. After the appearance of daylight outside, the lamps are turned off. With the return of dusk in the late afternoon they go on again, and they continue to burn until 8 o'clock, when all are turned off except the 2-cp units. These lamps give a low illumination, simulating dusk, and the hens at once prepare to go to their roosts. Fifteen minutes later, when all are in place, the small "dusk" lamps are extinguished and darkness reigns in the chicken house until the next morning.

Two weeks after the present lighting system was installed the daily egg output had risen from twenty-six to eighty-three, according to the owner. Fifty eggs a day are now obtained during the molting season, in comparison with eleven eggs a day secured under the former artificial lighting conditions.

The Electric Display Truck

Some of the special advantages possessed by the storage-battery-driven truck over gasoline trucks were recently demonstrated in a striking manner in Pittsburgh in connection with a "Mardi Gras" parade. Effective use was made of the regular battery of the truck to obtain simultaneously five different voltages for advertising display and propelling the truck. The cells are of the "Exide" type connected in series to deliver 80 volts. An emf of 80 volts was used to drive the truck and to supply energy to the head and tail lamps. Fifty volts was used to drive a small motor-generator set which provided 110 volts for the "Du-

ILLUMINATED ELECTRIC DISPLAY TRUCK

quesne Light Company" sign across the front. This sign was made up of Federal letter units. Twelve volts was used to light the 265 5-watt, 11-volt sign lamps which outlined the truck and illuminated the sign at the top and the dozen suspended pumpkin faces. Six volts rang the bell used in place of a horn. A striking and startling effect was produced at frequent intervals

by an operator who touched together two heavy copper electrodes connected through a suitable resistance to the full voltage of the batteries. The long green arc produced when the electrodes were slowly separated gave the same effect as when a trolley pole comes off the wire. Being very close to the faces of the closely packed spectators, the effect was startling.

Mr. C. W. Ward, superintendent of the laboratory of the Duquesne Light Company, was responsible both for the idea of entering a truck in the parade and for the scheme of display used.

Shortening the Walk from "Movie" to "Movie"

Two moving-picture shows in Alliance, Ohio, are owned by the same man. They occupy exactly similar positions on parallel streets just two blocks apart, and

LIGHTING THE ALLEY BETWEEN "MOVIES"

whereas through the alley it is only two blocks from show to show, by way of the streets the distance is somewhat longer. Since the alley is paved, the owner of these shows decided to make the passage as good and as safe a thoroughfare as the streets. He did so by installing six 500-watt gas-filled tungsten lamps in inexpensive "promotion type" fixtures on the telephone pole in the alley. The first night these alley lamps were lighted a partial count showed that more than 150 people came out of one show and followed the shoveled pathway through the lighted alley to the other "movie." The owner of the two picture shows and the alley lighting is well pleased with his latest electrical business getters, and declares that there is nothing so attractive as "bright lights" to a pleasure-seeking crowd.

Increasing the Usefulness of the Lamp-Counter

On the lamp-exchange counter and on the contract counter in the Kansas City (Mo.) Electric Light Company's office electric irons and toaster stoves are continually displayed. Every visitor and every person transacting business at either of these two counters is politely invited to inspect the appliances, the clerk assisting by manipulating the switch controlling the current and at the same time pointing out the advantages of the electrical devices. Prospective customers are offered irons on thirty days' free trial. If at the end of that period the iron has not been returned, the customer is billed for the device and may, if he so elect, pay for it in three instalments.

Since this plan has been put into effect an average of five irons a day has been put out on trial, and surprisingly few have been returned. Mr. C. F. Farley, who is in charge of the company's lighting and appliance business, praises this selling plan highly and states that it reaches new customers promptly and reaches old customers who might never be reached by other means.

Increase in Electric Service at Canton, Ohio, in Spite of Cheap Gas

During the year 1914 the new-business department of the Canton (Ohio) Electric Company secured practically twice as many residence-lighting contracts as had been obtained in 1913, and this record was made in spite of the fact that natural gas is available locally for lighting at 32 cents per 1000 cu. ft. As an example of how thoroughly house wiring has been solicited, Mr. Robert E. Lane, new-business manager of the company, cites an instance in one district in the city wherein 139 out of the 142 houses erected were wired and are now receiving the company's service. In order to make sure that no opportunity of securing a lighting contract shall escape, the new-business department keeps a very close watch on all building permits issued by the city. The idea that every building should be wired for electric light was ingeniously worked out in the company's double window display during Christmas week. In one window a lighted Christmas tree formed the chief decoration, and in the other window there was an electrically lighted log cabin with the company's distribution lines traversing the "snow-drift"-covered road in front of the house.

An Economical Electric Sign

An electric sign advertising a Chinese restaurant in the French language is shown in the accompanying illustration, the photograph having been taken recently on the streets of old Quebec, that quaintest of Canadian cities. The establishment pictured is a thoroughly up-to-date one, however, and its proprietor appreciates the attractions of electric lighting, fan-motor and telephone service no less than the publicity device shown. The sign is 18 in. by 30 in. in dimensions and is economically

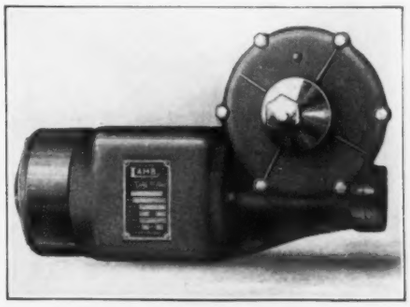
FRENCH SIGN FOR CHINESE RESTAURANT

illuminated by eight 2-cp lamps, service being supplied to the establishment by the Dorchester Electric Company. Quebec is bi-lingual, and the successful central-station solicitor is obliged to speak French and English equally well in order to "hold his job" in this town of historic contrasts.

NEW APPARATUS AND APPLIANCES

Electric Starter for Used Cars

An electric starting device which can be attached to the engine shaft of an automobile engine to eliminate hand cranking is being made by the F. Jos. Lamb Company, 940 Jefferson Avenue East, Detroit, Mich. The



ELECTRIC STARTING DEVICE FOR GASOLINE AUTOMOBILES

apparatus consists of a motor and generator which are connected to a battery. The motor is connected to the front of the car through worm-gear reduction. The generator is a 12-volt machine and can be driven either by chains or belts. The energy output is automatically controlled.

Fixtures for Nitrogen-Filled Street Lamp

The outdoor lighting units shown herewith are designed for use with high-efficiency incandescent lamps arranged in series. The fixtures consist of a porcelain

FIG. 1—FIXTURE WITH REFRACTOR FOR 250-CP, 400-CP AND 600-CP LAMPS

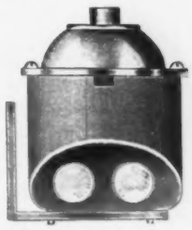
insulator carrying a series-film cut-out socket and cast-iron canopy for support either from center span or bracket. Two kinds of concentric-ring reflectors are employed, one being 18 in. in diameter and being de-

FIG. 2—FIXTURE FOR 60-CP, 80-CP AND 100-CP LAMPS

signed for use with lamps with ratings of 60 cp, 80 cp and 100 cp, and the other 20 in. in diameter and being designed to take 250-cp, 400-cp and 600-cp lamps. A 6.5-in. Holophane refractor may be used with the 60-cp, 80-cp and 100-cp lamps, and a 8.5-in. refractor with the 250-cp, 400-cp and 600-cp lamps if desired. Ample ventilation is provided, the manufacturers declare, and cooling air flows upward over the lamp bulb and socket, through the porcelain insulator, and comes out under the cast-iron canopy at the top of the hood. The fixtures described are being made by the Adams-Bagnall Electric Company, Cleveland, Ohio.

High-Voltage Push-Button

A push-button which is similar in size, design and appearance to the ordinary battery push-button and is designated as the "push easy" button has been developed by the Russell Electric Company, Danbury, Conn. It is rated at 6 amp at a pressure of 110 volts and 3



PUSH-BUTTON ATTACHED TO OUTLET BOX

amp at a pressure of 220 volts. The push-button is designed for use with bells, horns, relays and other electrical devices of the open-circuit type. The button closes the circuit only when held in by the finger and opens the circuit when the finger is removed. The button is shown in the accompanying illustration attached to an outlet box made by the above company.

Slip-Ring Induction Motors

Large slip-ring induction motors recently developed for continuous service, such as for operating pumps, blowers, compressors, hoists and other machinery requiring heavy torque at starting, are being made by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. One of the chief characteristics of these motors, the manufacturers declare, is great strength. The frame is massive, and the bearings and

FIG. 1—SLIP-RING INDUCTION MOTOR

shaft are very large. The windings are securely braced against vibration. The bearings are dustproof and rest on three machined seats, a construction that is said to be particularly adaptable for steel-mill service. All coils are form-wound and are insulated to ground before being placed in the slots. The stator slots are straight

open, while those of the rotor have an overhanging lip which assists in holding the coils in place. The shaft can be removed without disturbing the rotor winding. The bearing shell may also be removed and can be replaced without taking off the lower half of the bearing bracket. The brushes are readily accessible, as shown in Fig. 1.

FIG. 2—ROTOR OF SLIP-RING INDUCTION MOTOR

Gasoline-Electric Automobile

An automobile which is equipped with a 5-kw gasoline-engine-driven generator, a series-wound motor and a storage battery has recently been developed by the Galt Motor Company, Galt, Ont. A two-cylinder water-cooled engine which is cast in block form is utilized. The engine is of the crank-case compression type, the crank shaft of which is formed with cored-out crank disks, which nearly fill the crank case, thus reducing its volume and raising the initial compression. Use is made of a single transfer passage which communicates with an integral manifold, the distribution of the charges between the cylinders being effected by means of a cross intake piston valve which is actuated by the alternate pressures and vacuums in the crank chambers. A so-called "combustion cartridge" is provided which consists of a tubular chamber extending above the cylinder into which the charge is compressed. The spark occurs at the base of the chamber and in the cylinder proper, and the combustion flame backs into the tube slowly, producing a gradual rise in the expansion pressure, which is said to give an effect more like that of a steam engine than that usually obtained when the entire charge is ignited at once.

The generator operates at 50 volts and the motor at 48 volts and 35 amp, at 1300 r.p.m. The battery is divided into two groups and is carried on each side of the chassis outside of the frame. The motor is directly connected to the rear axle through a double universal-jointed shaft and four-to-one reduction. The engine is only 12 in. in over-all length and weighs 250 lb. The total weight of the car is approximately 5000 lb., but the company is also expecting to build automobiles of 2800 lb. and 3000 lb. The battery is of sufficient rating to operate the car for 20 miles over ordinary roads without the assistance of the engine. The car is geared for speeds up to 40 miles per hour.

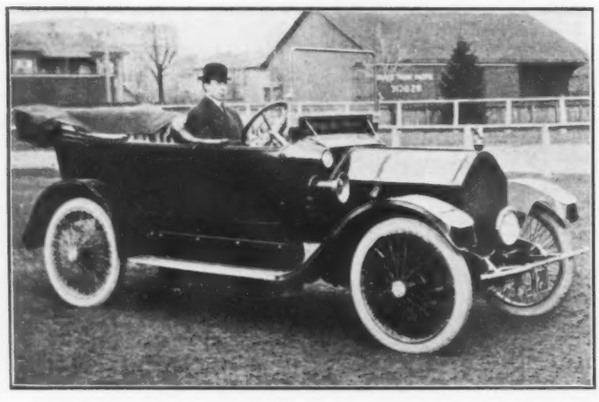


FIG. 1—"STORAGE GASOLINE-ELECTRIC" AUTOMOBILE

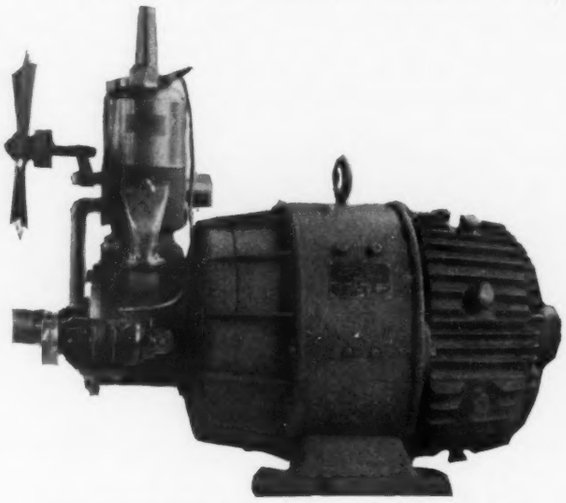
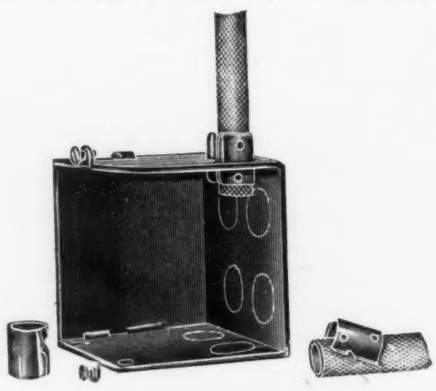


FIG. 2—GASOLINE-ENGINE-DRIVEN GENERATOR

Tests with the car shown herewith have shown a fuel consumption of 58.5 ton-miles per gallon of fuel. The fuel consumption of the power plant alone is claimed to be ⅞ pint per kw-hr. Aside from the claim for economy, this car is recommended by the builder for general contractor's use and for all other purposes where a portable power plant is needed, since the electrical energy of the generator can be readily applied to numerous uses without encumbering the machine itself with appliances. A special detail incorporated in the automobile described above is a swivel headlamp, which is mounted between the frame horns in front of the radiator and is swung to right and left automatically with the movement of the front wheels.

Bushing for Non-Metallic Flexible Tubing

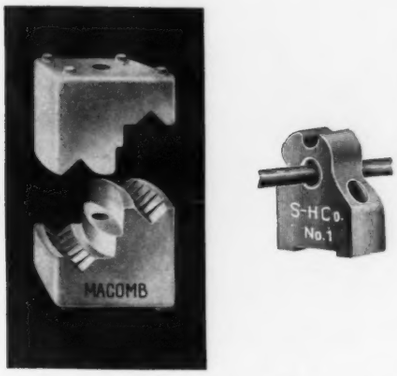
A bushing which is designed for use with non-metallic flexible tubing employed with outlet boxes and switchboxes having ⅝-in. knockouts is shown herewith. No tools are required to install the device, and it may easily be snapped on the tubing, the manufacturers declare, and inserted in position with the thumb and finger. The bushing is being made by the Metal Specialties Company, Kansas City, Mo.



BUSHING FOR FLEXIBLE TUBING

Porcelain Knobs

The reversible square knob shown in Fig. 1 is equipped with a curved wireway, which, the manufacturers declare, draws the wires very tight. It is also provided with a heavy central shoulder which gives strength at the weakest point. The knob shown in Fig. 2 is designed for rubber-covered wire in sizes up to and including No. 8. Tie wire can also be used with this knob. Only one screw or nail is necessary to fasten the device. Both knobs are the product of the Illinois Electric Porcelain Company, Macomb, Ill. The latter knob was designed by the Snyder-Hunt Company, of Belle Plaine, Ia., for which the above company is manufacturing the device.

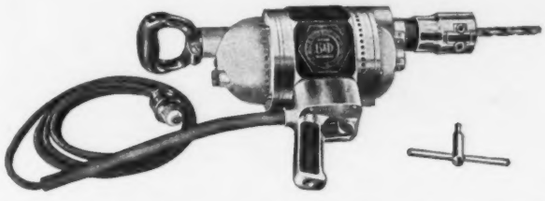


FIGS. 1 AND 2—PORCELAIN KNOBS

Portable Electric Drill

The drill illustrated herewith is designed particularly for drilling in corners or close to obstructions. The drill is balanced with relation to the grips so that it can be easily handled, and control is accomplished by means of one finger. The housings of the drill are cast from an aluminum alloy. The drill is designed for both oil and grease lubrication, and all gears are constantly bathed in non-fluid grease in a grease-tight compartment.

The motor operates on both direct current and alternating current, and will, it is claimed, carry heavy overloads. A forced-draft ventilating system is employed to keep the motor cool. The bearings and brushes of the motor are carried on a separate inner spider, and the commutator and brushes can be inspected while the drill is running. If desired, a breast plate or combination spade handle may be utilized in place of the rear grip shown in the accompanying illustration. With the larger sizes a second removable side grip is placed opposite to the switch grip, and for heavy drilling an "old man" is employed in addition to the rear grip. The drill is being made in two sizes for operation on 110 volts and 220 volts by the Black & Decker Manufacturing Company, Baltimore, Md., and is operated by a motor built by the Robbins & Myers Company, Springfield, Ohio.



ELECTRIC DRILL DESIGNED FOR WORKING IN CORNERS

Small Lighting Plants

In Fig. 1 is shown a 30-volt lighting outfit consisting of a shunt-wound 32-42-volt generator, belt-connected to a 1-hp gasoline engine, a switchboard and a sixteen-cell battery. In Fig. 2 is shown a switchboard and the battery of a combined alternating-current and direct-current 110-volt lighting set. The 30-volt outfit was developed for residence use, and the 110-volt set for a hospital, by the Barber-Dwinnell Electric & Manufacturing Company, Kansas City, Mo.

The above company is making two types of 30-volt plants, one for residences and the other for business houses and small institutions where most of the lamps are turned on at one time and are used for a certain period after which only a few lamps are required. For the latter a battery with rating much smaller than that needed with the former set is utilized. Provision is made so that the lamps can be operated either directly from the generator or from the storage battery, or the battery can be charged at the same time that the lamps are being used. The switchboard for the 30-volt plant is built as simply as possible, the manufacturers declare, and is equipped with voltmeter, ammeter pilot lamp, field rheostat, switches and automatic self-restoring circuit-breaker. The battery is of the sealed-in-glass-jar type, and is made by the above company. The battery is floated on the line at all times.

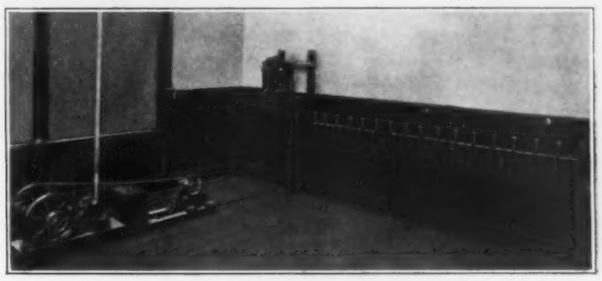


FIG. 1—30-VOLT LIGHTING SET

The Barber-Dwinnell Electric & Manufacturing Company is also making two types of 110-volt plants, one for large farms and small institutions and the other for villages and towns. The former is equipped with a battery of fifty-six cells of the open type and a 40-volt generator. The cells are charged in series, and if the lighting circuit is closed while the battery is charged, the pressure is reduced from 140 volts to 110 volts by

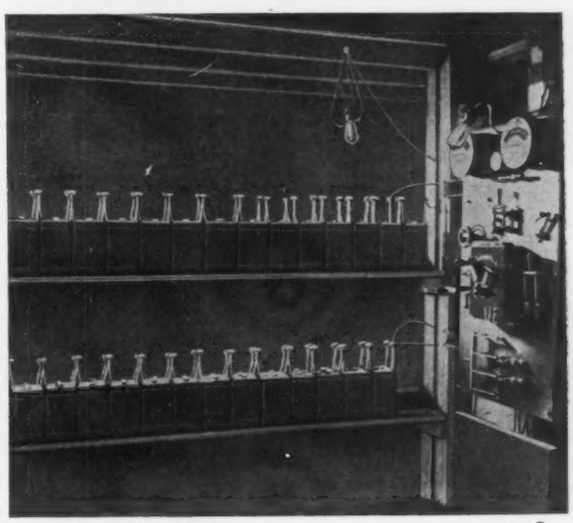
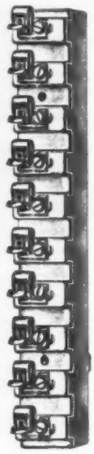


FIG. 2—BATTERY AND SWITCHBOARD OF 110-VOLT PLANT

means of the rheostat. The latter outfit includes a battery having from fifty-six to sixty-four cells, which is charged by dividing the cells into two groups of the same number and charging them in parallel. When energy is taken from the battery the cells are in series.

Connecting Block for Spring Binding Posts

The connecting block shown herewith was recently designed by the Fahnestock Electric Company, 129 Patchen Avenue, Brooklyn, N. Y., for the Western Union Telegraph Company. It consists of a glazed-porcelain base 10 in. long, 1.25 in. wide and 1.25 in.



CONNECTING BLOCK WITH SPRING BINDING POSTS

high. On this base are mounted ten spring binding posts, 1 in. between centers. There is a lug on one side of the connector to which one wire is soldered, the other wire being held by the spring. The connector stands on three small legs so that surface leakage is reduced to a minimum.

Weatherproof Pull Socket

In the new outdoor-type pull-chain socket developed by the Benjamin Electric Manufacturing Company, 128 South Sangamon Street, Chicago, the chain comes down in the annular space inside the outer shell so that when a shade or reflector is in place on the socket the chain falls inside the reflector and can therefore be operated by a straight pull from beneath. The chain is thor-

WEATHERPROOF PULL SOCKET

oughly insulated from all electrical parts of the receptacle. By means of the threaded ring on the lower part of the socket, shades, globes and reflectors of various types may be attached. The metal shell is furnished in brass, copper and aluminum. This weatherproof pull socket has been approved by the Underwriters.

Electrically Operated Vacuum Cleaner for Cylinder Presses

In the accompanying illustrations is shown a vacuum-cleaning outfit designed for use on any printing, lithographing or offsetting press of the cylinder type. The

FIG. 1—MOTOR-DRIVEN BLOWER

outfit consists of a series of vacuum cleaning nozzles which are connected to a series of manifolds graduated in size to insure uniform velocity of suction at all points. A hose is attached to these manifolds, which runs out and down alongside the press to a motor-driven suction fan which can be installed either under the press or to one side. The nozzles extend the full length of the cylinders, and they are placed in such position and at such an angle that as the paper leaves the press a

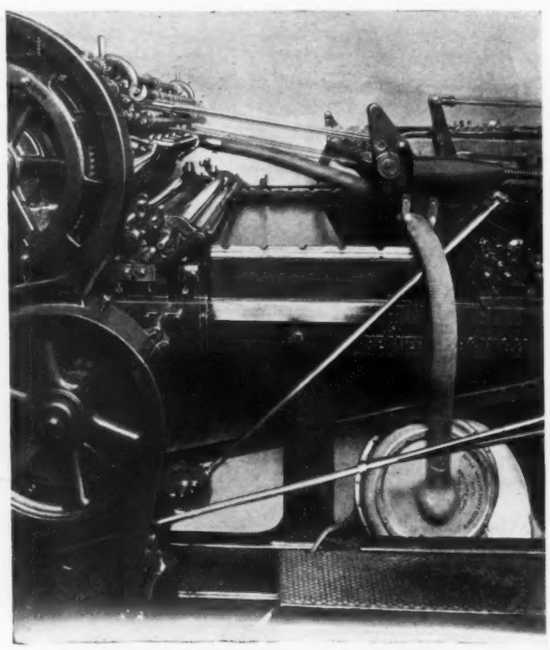


FIG. 2—CLEANING APPARATUS INSTALLED ON PRESS

suction action along the surface and edges is produced which removes all the loose dirt and foreign matter. On the second revolution of the press all the dirt left over from the under side of the sheet is collected before it has a chance to reach the forms. In this way the forms are kept clean, thus insuring clean inking rolls and

clean ink. The nozzles are of aluminum and are faced with brass. The manifolds and fan are also of aluminum, while the blower is of cast iron. The motor used in the operation of this outfit is a 1-hp direct-current high-speed machine made by the Robbins & Myers Company, Springfield, Ohio. The outfit is known as the Doyle vacuum sheet cleaner and is manufactured by Britton & Doyle, 205 Caton Building, Cleveland, Ohio.

Color-Matching Outfit

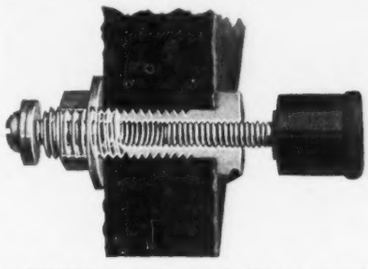
Apparatus for producing light having a daylight value has been developed by the General Electric Company, Schenectady, N. Y. The equipment consists of an arc lamp, a reflecting hood and a color screen. The colored

COLOR-MATCHING APPARATUS WITH SCREEN LOWERED

glasses forming the screen are 16 in. in diameter and are placed in the large end of a conical hood which is attached to the casing of the lamp. The hood surrounds the inner globe and is provided with a reflecting surface.

Binding Post

In the accompanying illustration is shown a binding post designed for use with electrical instruments and other kinds of apparatus. The device consists essentially of a hollow bolt threaded both outside and inside into which is screwed another bolt with an insulated head. A hexagonal nut is employed to fasten the hol-

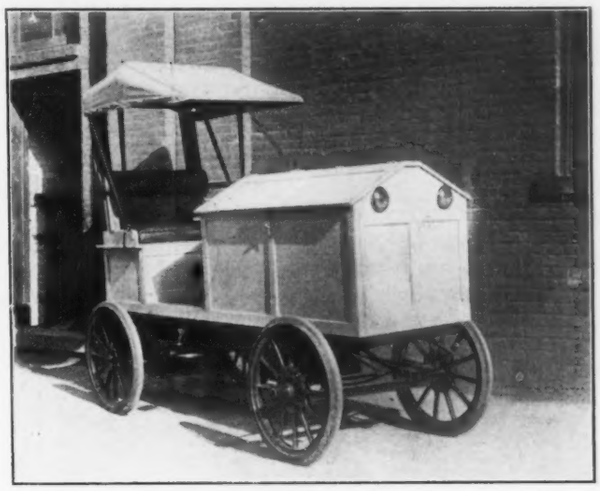


SECTIONAL VIEW OF BINDING POST

low bolt to the switchboard or other base with which it may be used. The threaded part of the smaller bolt is ⅞ in. long. The rear connection is made by means of a screw and washer. All metal parts of the device are of brass. The binding post is being made by the States Company, Hartford, Conn.

Light-Weight, Low-Priced Electric Delivery Vehicle

In the accompanying illustration is shown a 500-lb. low-cost electric parcel car. The car operates at a speed of 15 miles per hour, and it will travel 45 miles to 50

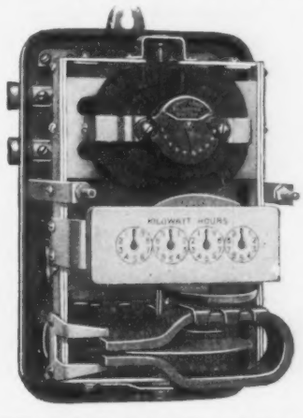


ELECTRIC PARCEL CAR

miles on one charge, depending on the load carried and the road conditions. Wooden wheels equipped with solid rubber tires are utilized, and the wheelbase is 68 in. Worm-and-gear drive is employed. The car is operated by a General Electric motor, rated at 28 volts and 40 amp. The battery equipment consists of either twelve lead cells or twenty-four Edison A-4 cells and is carried under the driver's seat, which is at the back of the car as shown. The frame of the car is of pressed steel, and the body consists of metal panels mounted in a wooden frame. Provision is made so that a charged battery can be substituted for one that is discharged if desired. The car is being placed on the market by the Cyco-Lectric Car Company, 1790 Broadway, New York.

Direct-Current Watt-Hour Meter

A small-sized direct-current watt-hour meter has recently been developed by the Duncan Electric Manu-



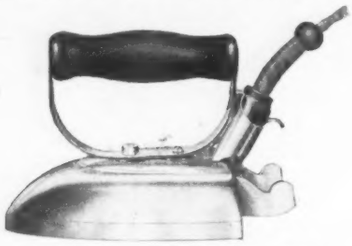
SMALL-SIZED DIRECT-CURRENT WATT-HOUR METER

facturing Company, Lafayette, Ind., with ratings of 2.5 amp, 5 amp, 7.5 amp and 10 amp for 110 volts and 220 volts. The framework to which the series field coils, the upper bearing and the registering train are attached is of channeled brass and is fastened to a hard-drawn sheet-brass back support by means of a

series of strong legs. Instead of supporting the permanent magnets from the bottom these are supported from the top, which arrangement, it is declared, allows ample space for adjusting the magnets and permits greater access to the aluminum disk and the lower jewel bearing. The compensating coil and switch are made in one unit and the registering train is in the center of the meter, thereby allowing free access to the commutator and brushes. The meter weighs 10.5 lb. and the ratio of torque to weight remains the same as in the larger types made by the company.

Electric Iron

With the electric iron shown herewith a stand is not required, as an attachment is provided so that it can be tipped on end when not in use. A quick-break switch plug is utilized, and to operate the switch it is necessary



ELECTRICALLY OPERATED IRON

to pull the knob on the tension spring. The handle is ebonized and the iron may be finished in bright nickel if desired. The iron is well balanced, the manufacturers declare, and consumes 500 watts. It is being placed on the market by the Pelouze Manufacturing Company, 232 East Ohio Street, Chicago, Ill.

Electric "Safety" Lamp

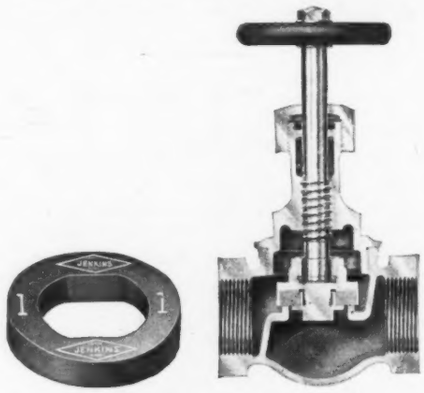
An electric hand-lamp provided with an attachment so that if the glass breaks or the reflector is crushed or punctured the circuit is opened before the bulb breaks is shown herewith. The battery and lamp are

ELECTRIC HAND LAMP

inclosed in an air-tight and water-tight aluminum case. The electrolyte of the battery is plastic and therefore will not spill or leak out. The lamp will burn twelve hours on one charge. It is being placed on the market by the Hirsch Electric Mine Lamp Company, 314 North Twelfth Street, Philadelphia, Pa.

Composition Disk for Globe Valves

An improved composition disk has recently been developed by the Jenkins Brothers, 80 White Street, New York, for globe, angle, cross and radiator valves. The material from which this device is made is very hard, it is declared, but becomes tough and flexible in service



FIGS. 1 AND 2—DISK AND GLOBE VALVE

when under steam pressure. The composition disk is used in place of a solid metal clapper and is contained in a brass disk holder. When the valve is closed the disk rests upon a raised brass seat in the body of the valve. The disk presents a slightly yielding surface to the valve seat and adapts itself to any roughness or unevenness of the seat. In case there is grit or scale on the seat, it tends to embed itself in the composition material, without injury to the metal seat. In case the disk should wear out, a new one could be substituted in a very short time. The disk is provided with a flattened hole as shown, which corresponds in shape to the projection on the disk nut shown in the sectional view of the valve in Fig. 2.

Double-Deck Electric Incubator

In order to obtain an even distribution of heat, the electrically operated double-deck incubator shown in the accompanying illustrations is equipped with two heating units, one of which is at the top of the device and the other at the bottom. The sectional view given in Fig. 1 shows the arrangement of the egg tray and chick tray and heating coils. The dotted lines represent the

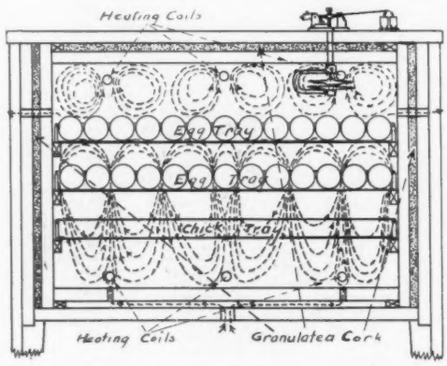


FIG. 1—SECTION OF DOUBLE-DECK INCUBATOR

paths of the heated-air currents. The temperature of the coils is never more than 250 deg. Fahr. A regulating device is employed to maintain a constant temperature of 103 deg. Fahr., which has been found to be the most suitable temperature for hatching the eggs. A button-controlled lamp is also provided with the incu-

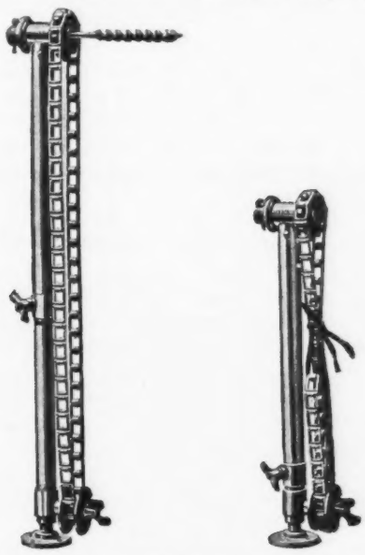
bator. Moist-sand trays are placed beneath the eggs to prevent too rapid evaporation of the liquid content of the egg. Ventilation is obtained by means of a hole in the bottom of the device as shown in Fig. 1, which may be covered by a slide if desired. The box is double-

FIG. 2—200-EGG DOUBLE-DECK INCUBATOR

walled, and between the walls is a layer of granulated cork. An inner front door is provided, which is of glass. The incubator is being made by the Electric Specialty Company, 154 South Main Street, Salt Lake City, Utah.

Collapsible Hand-Boring Machine

A light-weight hand-operated machine for boring holes for electric wires which can be collapsed from a working length of 28 in. to one of 18 in. so that it can be packed in a tool bag has recently been placed on the market by the Henderson Electric Company, Ampere,



FIGS. 1 AND 2—BORING MACHINE

N. J. The device will bore holes at any angle, the manufacturers declare, through studding, bridging, plates, floors and joists. The above company also makes a large machine similar in design to the collapsible machine, although it is only used for boring holes in joists. All working parts of the two types are interchangeable. The larger machine stands on the floor, while the smaller one may be employed in a manner similar to that in which a breast drill is used. The collapsible machine weighs only 6 lb. Use is made of ball bearings, drop forgings and seamless tubing. The device is operated by pulling on a chain, causing the drill to revolve.

Portable Lighting Fixtures with Extension Arm

The fixture shown in Fig. 1 is equipped with a heavily weighted base and an extension arm, and by means of various adjustments the lamp can be placed in prac-

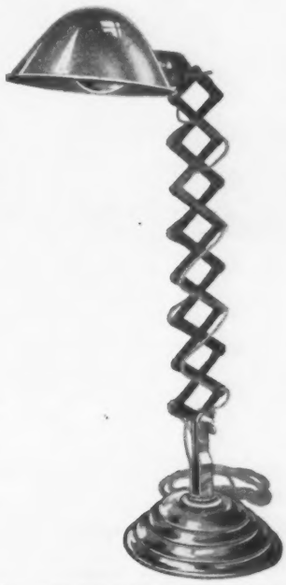


FIG. 1—FIXTURE WITH WEIGHTED BASE

tically any position desired. The lamp shade is so attached that it can be revolved around the lamp and the lamp itself can be tilted at any angle desired. The arm can be extended from a length of 5 in. to one of 25 in. An adjustment is also provided so that the arm can be tilted from a horizontal to a vertical position and from a vertical to a horizontal position in the other direction. Finally another adjustment is provided which permits the revolving of the whole fixture on the base.

The fixture shown in Fig. 2 is designed for use with a device called a telephone mounting, which consists of a receptacle that may be attached to a bracket or pedestal into which the arm of the fixture fits. The

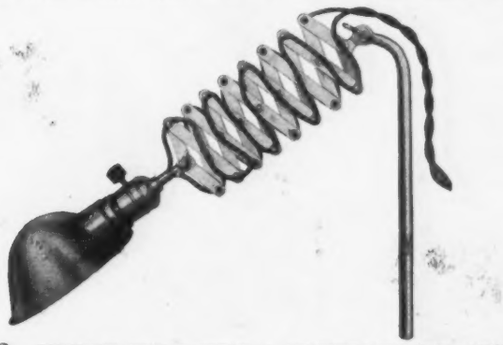


FIG. 2—FIXTURE WITH SPECIAL RECEPTACLE FOR ARM

fixture has the various adjustable features with which the device shown in Fig. 1 is provided.

Both fixtures are finished in oxidized-copper or brush-brass and are being made by the American Electric Company, State Street and Sixty-fourth Street, Chicago, Ill.

Conduit Bushing Adapters

Devices designed for fitting conduit of a certain diameter to holes of larger diameters or to holes of smaller diameters as the case may be are shown here-

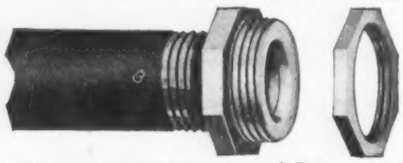


FIG. 1—ADAPTER ATTACHED TO 0.5-IN. CONDUIT FOR FITTING TO 0.75-IN. HOLE

with, and an adapter, as it is called, for the former case is shown in Fig. 1, and one for the latter in Fig. 2. The devices are of malleable iron and are sherardized.

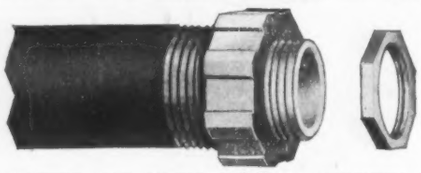


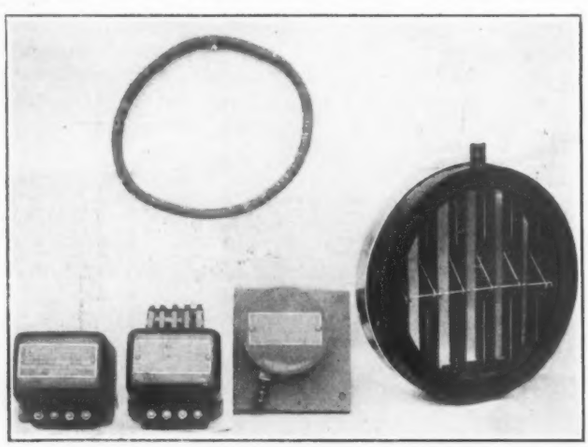
FIG. 2—ADAPTER FOR FITTING 0.5-IN. CONDUIT TO 0.375-IN. HOLE

They are being placed on the market by the Steel City Electric Company, 1207 Columbus Avenue, Pittsburgh, Pa.

Electrical Devices for Gasoline Automobile

A device for decreasing the glare of automobile headlamps was described in the ELECTRICAL WORLD of Feb. 7, 1914. This device has been improved and in its new form is shown herewith. The "Nodaz," as it is called, consists of a number of translucent shutters which may be opened and closed by means of a solenoid operated from the driver's seat.

A new type of belt for automobile lighting outfits is also illustrated herewith. It consists of a number of units with leather-covered elastic cores. This arrangement has been adapted, the manufacturers claim, to secure maximum tractive effort. The combined lighting switch and dimming device for automobiles shown has recently been developed. The handle can be moved to



DEVICES FOR AUTOMOBILE LIGHTING OUTFITS

the "off," "very dim," "dim" and "full" positions. A small porcelain disk is provided on which the resistance wire is enameled. The disk carries the operating lever and is inclosed in a spun-brass case.

The automatic dynamo controllers illustrated are designed for automobile-lighting dynamos with low field current and high field current. The controllers are equipped with self-cleaning vibratory contacts. Controllers designed for low field currents have one set of vibrating contacts. The other controllers have two sets which are operated by a single vibrating keeper so as to utilize two steps of resistance. The latter are designed for fields taking 10 amp at 6 volts.

The devices described above are being made by the Ward Leonard Company, Bronxville, N. Y., and were exhibited at the recent New York automobile show.

Downward Light Tungsten Lamp

Duhrssen & Pfaltz, Inc., of 19 East Seventeenth Street, New York, are marketing in this country the "Sunlite" reflector Pope-Holland lamp shown herewith. A horizontally concentrated spiral-tungsten filament of rugged construction is used so that the largest part of the light of the lamp is projected downward. To the same end the lamp is equipped with an opaline glass reflector which is detachable. The latter fits snugly over

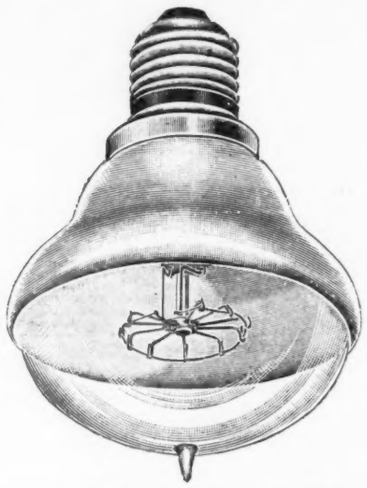


FIG. 1—TUNGSTEN LAMP SENDING LIGHT DOWNWARD

the base of the lamp and is held in place by a small cap which screws on a threaded skirt insulated from and below the shell of the base. Owing to the construction of the filament, the turnip shape of the lamp bulb and the glove-fitting reflector, the maximum amount of light falls immediately below the vortex of the lamp. Thus in the case of a lamp rated at 25 cp the distribution

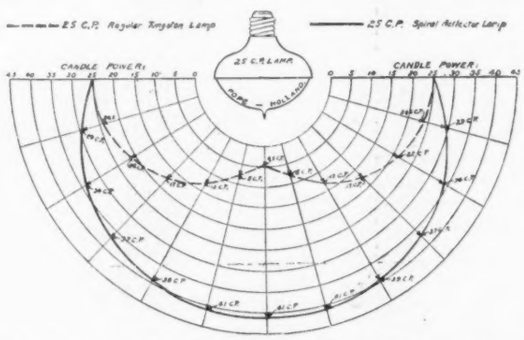


FIG. 2—DIAGRAM SHOWING DISTRIBUTION OF LIGHT

from a regular pear-shaped tungsten lamp and a tungsten lamp of the "Sunlite" type is claimed to be as shown in the diagram herewith. The lamp is especially adapted for use in factories, machine shops, printing offices, show windows, etc. It is made in standard sizes in ratings from 25 to 300 watts, with or without reflector.

CURRENT NEWS SECTION

National Association of Manufacturers of Electrical Supplies

Mr. R. K. Sheppard, of the B. F. Goodrich Company, Akron, Ohio, who is chairman of the special committee of electrical interests which met at the Hotel Biltmore in New York on Jan. 12 to discuss the possibility of forming an electrical manufacturers' association, has made appointments to the two committees called for by that meeting as follows: Committee of nine of organization, Mr. W. T. Pringle, Pringle Electric Manufacturing Company, Philadelphia, chairman, and Messrs. Walter Cary, Westinghouse Lamp Company, New York; D. C. Durland, Sprague Electric Works of the General Electric Company, New York; W. C. Robinson, National Metal Molding Company, Pittsburgh; E. R. Harding, Holtzer-Cabot Electric Company, Brookline, Mass.; George A. Cragin, American Steel & Wire Company, Worcester, Mass.; N. C. Cotabish, National Carbon Company, Cleveland; J. W. Perry, H. W. Johns-Manville Company, New York; J. E. Way, R. Thomas & Sons Company, East Liverpool, Ohio.

The committee of five to draft nominations for a committee of commercial and technical experts to pass on the relative efficiencies of the concentric-wiring system and the systems at present in use in this country consists of the following: Mr. Leroy Clarke, Safety Insulated Wire & Cable Company, New York, chairman, and Messrs. H. B. Crouse, Crouse-Hinds Company, Syracuse, N. Y.; L. W. Downes, D & W Fuse Company, Providence, R. I.; Gerard Swope, Western Electric Company, New York, and W. C. Bryant, Bryant Electric Company, Bridgeport, Conn.

February Meeting Postponed

The organization committee finds that the task given to it is of such moment to the electrical industry that more time will be needed than the period first contemplated. The result is that the chairman of the meeting of electrical manufacturers has postponed from Feb. 9 to March 9, 1915, the call for the next meeting of the manufacturers.

At a meeting of the organization committee on Feb. 1, 1915, that committee unanimously adopted the following resolution:

"Whereas the manufacturers of electrical apparatus already are admirably equipped with a working organization—the Electric Power Club; and whereas the Electrical Manufacturers' Club, comprising in its membership most branches of the electrical manufacturing industry, has from time to time dealt with general problems affecting the entire electrical manufacturing industry; and whereas the manufacturers of electrical supplies are not similarily organized; and whereas the necessity of active co-operation throughout the entire electrical manufacturing industry is apparent;

"Be it resolved, that this committee shall recommend to a meeting of the electrical manufacturers of the United States to be called by this committee to convene in New York at the Biltmore Hotel:

"First—A plan for the formation immediately of a National Association of the Manufacturers of Electrical Supplies;

"Second—That subsequent to such organization said association appoint a committee of five members who shall request a conference with a similar committee of five members of the Electric Power Club, to consider jointly with the Electrical Manufacturers' Club the practicability of utilizing the Electrical Manufacturers' Club as a governing body to deal with the larger questions affecting the entire manufacturing industry, embracing both manufacturers of electrical supplies and manufacturers of electrical apparatus."

Co-operation of All Electrical Manufacturers Desired

Mr. Sheppard welcomes communications from all electrical manufacturers who are interested in the contemplated organization and desires to disseminate widely the invitation to the meeting to be held March 9, at which gathering the organization committee will give its report. At that same meeting the nominating committee will also report suggestions for the personnel of the proposed representative committee of business and technical experts, which committee is to study thoroughly present practice of all-insulated circuits and coincidently the principle of grounded and return circuits and endeavor to produce something better than concentric wiring. That committee will probably include in its personnel business and technical experts and representatives of research and development departments of manufacturing and other enterprises, including the Underwriters' Laboratories and the National Electric Light Association. It is suggested that to such a committee the industry should intrust the determination of the relative efficiencies of the two systems (a) as to safety to persons, (b) as to protection against fire, (c) as to the possible provision of methods of wiring at low cost, combined with ease of installation and sufficiently attractive appearance to obtain popular approval.

The committee is also to present to the entire industry the results of its investigations in the form of concrete recommendations, including standard systems, standard devices and standard appliances.

Preliminary Draft of Concentric-Wiring Rules

The sub-committee on electric wiring of the National Fire Protection Association, of which Mr. W. H. Blood, Jr., of Boston, is chairman, has prepared a preliminary draft of suggested requirements for concentric wiring, subject to discussion at the March meeting of the electrical committee of the association. The sub-committee does not at this time recommend these or any rules for concentric wiring for inclusion in the National Electrical Code, but recommends that the fullest discussion be given to the tentative regulations and that copies be supplied on application by the electrical committee and by the Underwriters' Laboratories.

The introduction to the draft points out that the interest in a system of grounded concentric wiring has arisen chiefly from two considerations:

First—A desire for a system of wiring possessing advantages of low cost, ease of installation and good appearance.

Second—A desire to protect persons against injury by the use of a grounded system having no ungrounded exposed current-carrying parts.

It is the intent of the following suggested and illustrative rules to prescribe, only for possible experimental and development purposes, the general conditions for a system of grounded concentric wiring. These illustrative rules are, therefore, only a partial outline of possible future requirements and are subject to revision, modification and extension resulting from further information and experience when such is obtained. A system which fulfils the conditions outlined below and no more will not necessarily be acceptable, and suggestions for the further development of similar systems and the requirements applying to them are invited. All appliances and systems should, in the opinion of the committee, be submitted to the Underwriters' Laboratories for examination and report.

Suggested Requirements of Grounded Concentric System

A. Must be connected only to normally grounded systems where the difference of potential between any wire and ground does not exceed 150 volts.

B. Must be used only for branch circuits of not over 660 watts each nor more than sixteen sockets or receptacles.

C. Must be used for exposed work only. Must never be run on or in floors or in concealed spaces except where passing directly through floors or partitions. Where passing through a floor must be carried through an iron pipe extending from the ceiling below to a point at least 3 in. above the flooring. Additional mechanical protection may be required by the inspection department.

D. Must be continuous from outlet to outlet without splices or taps unless approved splice or tap fittings are used.

E. The radius of the inner edge of any bend to be not less than 3½ in.

F. The outer conductor or sheath must be permanently and effectively connected to the grounded supply wire at or near the point of supply of the concentric system, and on the house side of the service switch and fuse.

G. Must be equipped at every outlet, splice or tap with a fitting approved for this purpose.

The ends of the outer conductor or sheath must be secured at every outlet, splice or tap so as to secure electrical continuity between all portions of the outer conductor or sheath.

No soldered connections shall be made to the outer conductor or sheath at any point, but approved clamping devices or binding posts on terminal plates in fittings shall be used for all tap wires to sockets or other connected fittings.

H. No switches shall be placed in the outer conductor or sheath, and no switches in any part of the system to which the concentric wiring is attached shall be of a type or so installed that the outer conductor or sheath can be disconnected from the grounded wire of the supply system without simultaneously disconnecting the inner wires.

I. Fuses must not be placed on the outer conductor or sheath of the concentric system nor in the grounded wire of the supply thereto within the building in such a way that their operation can under any condition break the connection of the outer conductor or sheath with the grounded wire of the supply system within the building.

An approved fuse of capacity not larger than 10 amp. must be placed so as to protect the inner conductor of each 660-watt circuit.

J. At all outlets or junction points approved fittings must be used, which shall provide for the suitable insulation of the inner conductor and secure electrical continuity of the outer conductor or sheath through the fittings.

K. Where concentric wires enter or leave metal outlet or switch boxes or cabinets the outer conductor or sheath shall be mechanically and electrically secured thereto by suitable clamps or other approved means.

Where liable to come into contact with water or gas pipes or other grounded metal the outer conductor or sheath must be effectively connected electrically thereto or insulated therefrom by some reliable means.

L. Must be securely supported at least every ½ ft. by means of approved clamps.

Construction Rules

M. Must comply with the requirements of the National Electrical Code Rules Nos. 49, 50-a, b, c, e, g and i, except that insulation resistance and voltage tests shall be made without immersion and between the inner and outer conductors.

N. Concentric wires for systems of this type must be of approved form and construction, and the inner conductor must be of copper of No. 14 B. & S. gage.

O. Between the insulation and the outer conductor there must be a firm continuous tape or braid of approved material.

P. The inner and outer conductors must be of copper and the inner conductor must be thoroughly tinned.

Q. The outer conductor or sheath must be so applied as to fit closely and tightly and must be continuous. The conductivity of the outer conductor or sheath must not be less than that of the inner conductor. The completed wire must be of approximately circular section at all points.

The report is signed by the members of the subcommittee on concentric wiring of the National Fire Protection Association—Messrs. J. C. Forsyth, New York; Washington Devereux, Philadelphia; Dana Pierce, New York; A. M. Paddon, Syracuse, N. Y.; G. S. Lawlor, Boston; James R. Strong, New York; H. R. Sargent, Schenectady, N. Y., and W. H. Blood, Jr., chairman, Boston.

Slate for the Federal Trade Commission

The latest "slate" at Washington for the Federal Trade Commission includes Mr. W. J. Harris, of Georgia, Director of the Census, who is said to be in favor with President Wilson because the commission will require important data and statistics. Mr. Harris is a Democrat. The other members of the "slate" are Messrs. Joseph E. Davies, of Wisconsin, Commissioner of Corporations, and E. N. Hurley of Illinois, both Democrats; Mr. George L. Record, of New Jersey, Progressive, and Mr. W. H. Parry of the State of Washington, a "Progressive Republican."

It is said in Washington that the old-line Republicans in the Senate will never consent to the confirmation of Mr. Parry and that they will hold up the confirmation of the whole commission if a Progressive or two "Progressive Republicans" are named to the exclusion of a straight-out Republican. This, however, does not apply to Senator Jones of Washington, a regular Republican, who recommended one of his own political faith for appointment. Mr. Parry will not be objectionable to Senator Jones, who might smooth Mr. Parry's way with other old-line Republican Senators.

The fight on the ship purchase bill in the Senate is expected to play a part in the confirmation of members of the Federal Trade Commission, inasmuch as President Wilson has been seeking the support of Republicans for that bill to take the place of Democrats who have withdrawn their support. The President's

advisers in the Senate may suggest that he appoint a Republican of the old school on the commission in case it becomes apparent that Progressives cannot be confirmed.

Minnesota Electrical Contractors

A number of valuable papers relating to the work of the electrical contractor were presented at the winter meeting of the Minnesota Electrical Contractors' Association, held at the Hotel Radisson, Minneapolis, Jan. 27. Following the morning closed session, Mr. G. B. Muldaur, New York, spoke before the contractors at luncheon on the subject of the Society for Electrical Development, outlining the work the society is doing which will be of especial benefit to the electrical contractor.

At the afternoon session there was a brief discussion on bare concentric wiring, and several speakers declared that the introduction of such a system would seriously embarrass the contractors' business, besides revolutionizing electrical fittings and complicating stocks. Before declaring themselves for record, however, as either favoring or opposing this form of construction the contractors present voted to secure further information and to give the subject careful study.

Several construction kinks were described in a paper read by Mr. R. E. Russell, Minneapolis. Organization routine for handling out-of-town jobs was discussed by Mr. A. W. Lindgren, Duluth. The work-order system of the Electric Construction Company of St. Paul was outlined by Mr. C. M. Converse. Close attention to details of specifications when preparing estimates was urged by Mr. M. J. La Valle, Minneapolis. He recommended that the plans and estimates of all jobs figured be kept for reference at least five years. "Credits, Collections and Discounts" was the topic of a paper by Mr. W. H. Vilet, Minneapolis. The useful function of a "moral-risk club" among electrical credit men where first-hand ledger experience can be exchanged, supplementing ordinary financial ratings, was esphasized in his remarks. The problem of poor specifications was also discussed by Mr. A. W. Zahm, Minneapolis, and others.

Mr. A. L. Abbott, St. Paul, is president of the Minnesota Electrical Contractors' Association, and Mr. G. M. Jones, Minneapolis, is secretary. Duluth has been selected as the place of the annual summer meeting.

Elimination of Old-Code Wire

A report was presented recently before the Western Association of Electrical Inspectors which showed that while the use of "old wire" has been constantly decreasing, "old wire" cord and fixture wire are still employed to an alarming extent in the cheaper devices and fixtures sold by hardware, department and small supply stores. The use of this sub-standard wire on portable apparatus where, roughly handled, it comes into contact with the hands of persons and with inflammable material constitutes one of the greatest hazards to-day.

Of thirty-eight wire manufacturers canvassed by a committee of this association, twenty-five replied that they do not keep "old-code" wire, and three reported having limited stocks of such wire, from which, however, practically no sales are made for electric lighting purposes. Seventeen of these manufacturers make "old-code" wire on order, this demand coming chiefly from concerns dealing in automobile supplies. The remaining eleven manufacturers make no such sub-standard wire under any conditions. The present output of "old-code" wire amounts to hardly 1 per cent of the country's total rubber-covered wire production, and the manufacturers reporting were quite unanimous in expressing their wish to discontinue altogether the making of sub-standard products. With four exceptions, all believed the present-code wire satisfactory.

In accepting the report of the committee the association voted to ask the Underwriters' Laboratories to urge wire manufacturers to discontinue making sub-standard wire for lighting, heating and motor service and to designate "old-code" and sub-standard wire by suitable markings or labels.

Wiring Committee Activities

Mr. R. S. Hale, Boston, Mass., chairman of the N. E. L. A. committee on the wiring of existing buildings, has sent a letter to manufacturers of plugs and receptacles asking for a conference at the N. E. L. A. rooms, 33 West Thirty-ninth Street, New York, on Feb. 15, at 10 a. m. The latest draft of the committee's report on plugs and receptacles appeared in the Jan. 23 issue of the ELECTRICAL WORLD, and Mr. Hale points out that this report has been criticised by the central stations as not going far enough in the direction of standardization. It has been intimated that three or four large central stations are ready to get together and adopt a single plug and receptacle regardless of the patent question and of the effect on the market in case the committee cannot make further progress.

The time seems ripe for all the manufacturers to get together for a general discussion, followed by a thorough study of the plugs and receptacles now in the market, with a view toward weeding out those which are sure to fall by the wayside in time and of seeing what changes can be made to make interconnectable any now of the same type but of slightly different dimensions. Other points for discussion are the best means of establishing a standard type without hurting more than is inevitable the business in those types which are doomed to die; the consideration of patents, and the possibilities of making any arrangement within both the letter and the spirit of the present laws and in accordance with the feeling against combinations in restraint of trade. As a result of the report the Benjamin and Trumbull companies have agreed to manufacture interchangeable plugs and receptacles.

American Fittings Applicable to Concentric Wire

The study of grounded concentric wiring is being continued by the committee. Samples of the "Stannos" wire manufactured by Siemens Brothers & Company, Ltd., London, were recently tested by a prominent Boston wiring contractor, who came to the conclusion that American fittings can be used to advantage with this wire, although it is appreciated that new fittings may be developed in this country at low cost to meet the requirements of such systems, resulting in a further saving in installation cost. About 5000 ft. of concentric wire have been ordered by this contractor in the hope of securing permission, with central-station cooperation, to make a few experimental installations in houses. A current of 12 amp passed for four hours through a 1-18-in. Stubbs gage sample twisted joint of Stannos wire and sheathing developed so little heat that the finger could be placed upon the joint without discomfort at the end of the test. No sign of heating developed in a twenty-four-hour test with 8 amp.

Where a soldered joint is required a soft solder liquefied by a match must be used, as concentric-wire sheathing and insulation are not adapted to heating by a torch flame. A possible application of value for concentric wire is in lighting turbo-generators, the cost of the conduit wiring as now installed, with numerous

bends, reaching as high as $10 an outlet. There has been no decision as yet whether the practice approved by the English insurance companies in the installation of concentric wire will be applied in detail in the trial equipments contemplated in this country.

The next meeting of the committee on the wiring of existing buildings will be held in Boston either on Feb. 26 or March 5.

President Wilson Addresses American Electric Railway Association

President Woodrow Wilson talked on business at the midyear meeting of the American Electric Railway Association, held at the New Willard Hotel, Washington, D. C., on Jan. 29. Some of his striking remarks were:

"I have met many men whose horns dropped away the moment I was permitted to examine their character.

"It seems to me that I can say with a good deal of confidence that we are upon the eve of a new era of enterprise and of prosperity. Enterprise has been checked in this country for almost twenty years because men were moving among a maze of interrogation points. All sorts of regulation were proposed, and it was a matter of uncertainty what sort of regulation was going to be adopted.

"All sorts of charges were made against business, as if business were at fault, when most men knew that the great majority of business men were honest, were public-spirited, were intending the right thing, and the many were made afraid because the few did not do what was right.

"You cannot demoralize some of the forces of a community without being in danger of demoralizing all the forces of a community.

Now the Era of Confidence

"I feel that the mists and miasmatic airs of suspicion that have filled the business world have now been blown away. I believe that we have passed the era of suspicion and have come now into the era of confidence. Knowing the elements we have to deal with, we can deal with them, and with that confidence of knowledge we can have confidence of enterprise.

"And that enterprise is going to mean this: Nobody is henceforth going to be afraid of or suspicious of any business merely because it is big. If my judgment is correct, nobody has been suspicious of any business merely because it was big, but men have been suspicious whenever they thought that the bigness was being used to take an unfair advantage. Bond having been given for the big fellow, we can sleep o' night.

"There is a new atmosphere for business. The oxygen that the lungs of modern business takes in is the oxygen of the public confidence, and if you have not got that your business is essentially paralyzed and asphyxiated.

"My liberty consists in a sort of parole. Society says to me, 'You may do what you please until you do something that is in violation of the common understanding of the public interest; then your parole is forfeited.'

"You are not going to be barred from the contest because you are big and strong and you are not going to be penalized because you are big and strong, but you are going to be made to observe the rules of the track, and not get in anybody's way except as you can keep out of his way by having more vigor and skill than he has.

"When we get that understanding, that we are all sports and that we are not going to ask for, not only, but we are not going to condescend to take advantage of anything that does not belong to us, why then the atmosphere will clear so that it will seem as if the sun had never shone as it does that day.

"Some men are going to get beaten because they have not the brains, they have not the initiative, they have not the skill, they have not the knowledge, they have not the same capacity that other men have. They will have to be employees; they will have to be used where they can be used.

Rules of the Game

"First of all is the rule of publicity, not doing anything under cover, letting the public know what you are doing and judge of it as it is. There are a great many businesses in this country that have fallen under suspicion because they were so secretive, when there was nothing to secrete that was dishonorable.

"The minute I keep everything in my pocket and will not show anybody what is there, they conjecture what may be in my pocket; whereas if I turn my pockets inside out the conjecture is, at any rate, dissipated. If a business is being honorably done and successfully done, you ought to be pleased to turn it inside out and let the people whom you are inviting to invest in it see exactly how it is done and with what results. Let us see how you are running the game.

"In the second place, there is a full equivalent for money you receive, the full equivalent in service, not trying to skimp in the service in order to increase profits above a reasonable return, but trying to make the profits proportioned to the satisfaction of the people that you serve.

"In the third place, this game requires something more than ordinary sports. It requires a certain kind of conscience in business, a certain feeling that we are after all in this world because we are expected to 'make good' according to the standards of the people we live with.

"The fourth rule, as it seems to me, is the rule of having the spirit of service. I am not meaning a sentiment, I am not meaning a state of mind; I am meaning something very concrete—that you want to see to it that the thing that you do for the public and get money for is the best thing of that kind that can be done.

Scientific Ideals

"I have known many a man who gave up profit for mental satisfaction. There are men in the scientific bureau of this government whom I could cite who could make very big salaries, but who prefer the satisfaction of doing things that will serve the whole community, and doing them just as well as they possibly can be done.

"I, for one, am proud of the scientific bureau of this government. There are men in it of the most self-sacrificing spirit and of the highest scientific efficiency who do things on a petty salary which some other men would not do at all, because if you have to pay a man a salary to produce the best product of his brain, then he scales the product down to the salary. Here are men who scale the product up to the highest standards of scientific ideals.

Profits as High as the Rockies

"They have hitched their wagons to a star, and the star is about to lift their names above the names of the rest of us. So I say that if your earning capacity is the capacity to earn the public confidence, you can go about your business like free men. Nobody is going to molest you and everybody is going to say, 'If you earn big profits, if you have treated the people from whom you are making your profits as they ought to be treated,

if you treat the employees whom you use in earning those profits as they ought to be treated, if your methods of competition are clear and above reproach, why, then, you can pile these profits as high as the Rockies and nobody will be jealous of it.' Because you will have earned them in a sense that is the handsomest sense of all.

"The only reason we quarrel with reformers sometimes is because they are, or suppose they are, a little more enlightened than the rest of us, and they want us all of a sudden to be just as enlightened as they are, and we cannot stand the pace. If we could get our second wind, if we could keep up the pace as long as they do, we might be able to run as fast as they do, but we are more heavily weighted with clay than they are. And we like companionship. We want to wait for the rest of them. We do not want to be in a lonely advance climbing some heights of perfection where there is no good inn to stop at over night.

"All I ask is that if anything is being done that ought not to be done, the fault in it be conclusively pointed out and the way to correct the mistake be explicitly shown. There is an old rule that ought to obtain in politics as in everything else, and it is expressed in a very homely way. It is the rule of 'Put up or shut up'."

New York Conservation Commissioner McCabe Differs from Colleagues

The fourth annual report of the Conservation Commission of New York includes a statement of "Why Commissioner McCabe Differs from His Colleagues." Mr. McCabe believes in development of the State water-powers by private capital and is wholly opposed to governmental operation. He says in his statement in part:

"Germany and Canada seem to be much quoted as to the success and failure of governmental operation of public utilities by hydro-power in these countries. It is difficult to understand the quoting of conditions in foreign countries to prove the possibilities of a situation here. There is an element of politics in all public questions in this country which has no place in the affairs of foreign countries and which makes it impossible for this country to compete in a commercial enterprise with private corporations.

"This is a business question pure and simple, and must, if settled right, be settled by the rules of business. Think of having something to sell; you won't sell it to a rich man and a poor man can't buy it. The result is you must keep it—which is the case in this affair. If the price of the water-power of the State could be brought within the reach of the poor man, every poor man in the State would claim and want it. It is for this reason, and upon this principle, that franchises are given to the highest, not the lowest, bidder.

"I believe a measure can be drafted protecting to the fullest every interest of the State and, at the same time, not embarrassing the contractor, causing him fear and trepidation sufficient to paralyze his best efforts. Success for one is success for both, while failure for one is failure for both. Let another step be taken. Allow the criminal waste of the valuable water-power of the State to go no further. Nothing has been done, no progress has been made and no move forward can be made along the old lines—if it could have been it would have been."

The report of the commission as a whole declares that authority to control and regulate the material resources provided by nature is a necessary attribute of State sovereignty. The State should own and regulate the disposal of all additional water-power it may create. Whether the sorely needed development of water-power shall proceed under public or private auspices is a question so vital to the welfare of the State that it deserves the most earnest and thoughtful attention of the Legislature, the commission declares.

Meeting of Northern White Cedar Association

Twenty firms producing white-cedar lumber and poles were represented at the nineteenth convention of the Northern White Cedar Association, held at Minneapolis, Minn., Jan. 26 and 27.

General business conditions during the last twelve months have put a severe strain on the white-cedar industry, said President L. A. Page, Jr., in his official address. The stagnation produced by the European war will, he predicted, continue to hold up business in all lines for some time to come. If the financial reports are to be credited, the worst of the depression is now over, but the country is still far from normal. A gradual awakening of business is in sight, but when this comes the pole people expect to see the short-pole and post trades affected first.

Present Pole Stocks Ample for Probable Demand

A careful study of pole stocks now on hand, said the president, indicates an ample supply to take care of the probable demand. The salvation for the condition in which the cedar men are placed lies, indeed, in the fact that their own production for the present season has been so materially lessened. On the whole, declared President Page in closing, the cedar men may shortly look for a general resumption of business in all lines, coming gradually but surely.

During the year just closed the association has carried on a publicity campaign to interest and instruct users of white cedar. Similar exhibits will be extended to include conventions and local fairs. Mr. H. S. Gilkey is chairman of the committee having charge of this work. The report of Secretary N. E. Boucher referred to association matters, extensions of freight rates, exchange of credit information, etc.

Establishing Standards for White-Cedar Shipments

Tuesday afternoon was occupied with a discussion relating to the report of the committee on "war on substitutes" for white cedar. The members of this committee are Messrs. L. L. Hill, T. M. Partridge, E. L. Clark, J. E. Gerich, W. B. Thomas and M. Sperry. Means of securing closer co-operation between pole producers, distributers and users were discussed. The importance of shipping to customers only first-class stock, and thus establishing a standard of excellence for white-cedar products, was emphasized by several speakers.

In describing the work of the railroad committee, Mr. H. F. Partridge, Minneapolis, Minn., mentioned that the matter of increasing the allowance for stakes used on open cars is soon to be brought before the Interstate Commerce Commission for a formal hearing, in order that the shippers may prosecute claims for what they feel to be their rights.

At the close of the convention the following officers were elected for 1915: President, Mr. L. A. Page, Jr., Minneapolis, Minn.; vice-president, Mr. H. F. Partridge, Minneapolis, Minn.; treasurer, Mr. W. B. Thomas, Manistique, Mich.; secretary, Mr. N. E. Boucher, 743 Lumber Exchange Building, Minneapolis. Directors, Messrs. J. E. Gerich, Milwaukee, Wis.; M. J. Bell, Minneapolis, Minn.; William Patch, Menominee, Mich., and L. A. Furlong, Minneapolis, Minn.

Mr. Davies on the Federal Trade Commission

Commissioner of Corporations Joseph E. Davies made an address on "The Federal Trade Commission" before the Chamber of Commerce of the United States at the annual meeting, held at the New Willard Hotel, Washington, on Feb. 3 to 5. It is generally accepted that Mr. Davies will be a member of the commission, if not the chairman.

Mr. Davies referred to the power given to the commission to secure information, "to classify corporations and to make public, with due regard to the protection of trade secrets and lists of customers, so much thereof as is necessary in the public interest." "The justification of the commission," he added, "will be found in large measure in the extent to which the assembling, digesting and interpreting of these data shall develop into constructive aid to business enterprises of the country, and in the extent to which it will render service in giving a broad, sympathetic and accurate basis for the action of this governmental agency in the discharge of its functions in the service of the general public."

In referring to the practice which has grown up in connection with trust cases in the administration of the Department of Justice, of entering "consent decrees," Mr. Davies said:

"This method of accommodation of business to the requirements of the law contains possibilities for great good and equally great possibilities for disastrous harm. It has been used with the greatest of care and discernment by the Department of Justice in the past, and it is but natural that it would be used generally with a great deal of reluctance. By the Trade Commission act there is provided an additional agency available to the Department of Justice for bringing into harmony with the law the business practices of corporations. The Trade Commission furnishes a non-partisan body of men familiar with the whole field of industry to which matters of this kind may be referred for investigation, examination and recommendation. By reason of its non-partisan character and by reason of its technical knowledge it may be assumed that the recommendation of such a body would fortify the judgment of the Attorney-General in the estimation of the public, would relieve a single individual from the imposition of such a responsibility as this process necessarily involves, and might be productive of great good in the accommodation of business to law in the changing forms of our economic and legal development. This situation contains the suggestion of promise of a body of administrative law being built up which will be of great aid to business and of service to the country."

Commenting on the urgent representations that the Sherman law should not be applied to efforts of manufacturers to develop foreign trade, Mr. Davies observed:

"This phase of the controversy is a comparatively new one and is fraught with great importance. The information on this subject is sparse and largely based on hearsay. What is necessary in the situation are the facts, and the Federal Trade Commission is intrusted with the duty of investigating in foreign countries combinations and other trade conditions which may affect the foreign trade of the United States. Undoubtedly, in conjunction with the Department of Commerce and with the Department of State, a large amount of information can be obtained which will give authoritative information as to the facts which will enable the law-making power of the government to address itself to the problem with greater security and confidence."

The enactment of the trade commission law was attributed by Mr. Davies, more than to any other single cause, "to the sympathetic understanding, the genius for constructive statesmanship and the vision of the President of the United States."

President Wilson on Combination for Foreign Trade

President Wilson referred during his talk to the Chamber of Commerce to the subject of combination for foreign trade, saying:

"I speak of competition in foreign markets as between the merchants of different nations with a certain degree of hesitation, because the thing farthest from my thought is taking advantage of nations now disabled from playing the full part in that competition, and seeking a sudden selfish advantage because they are for the time being disabled. Pray believe me that we ought to eliminate all that thought from our minds and consider this matter as if we and the other nations of the world were in the normal circumstances of commerce. There is a normal circumstance of commerce in which we are apparently at a disadvantage. The anti-trust laws of the United States apparently make it illegal for merchants in the United States to form combinations for the purpose of strengthening themselves in taking advantages of the opportunities of foreign competition. That is a very serious matter, for this reason: There are some corporations and some firms, for all I know, whose business is great enough and whose resources are abundant enough to enable them to establish selling agencies in foreign countries, to enable them to extend the long credits which in some cases are necessary in order to keep the trade they desire—to enable them, in other words, to organize their business in foreign territory in a way which the smaller man cannot afford to do. His business has not grown big enough to permit him to establish selling agencies. The export commission merchant, perhaps, taxes him a little bit too high to make that an available competitive means of conducting and extending his business. The question arises, therefore, how are the smaller merchants, how are the younger and weaker corporations, going to get a foothold as against the combinations which are permitted and even encouraged by foreign governments in this very field of competition?

"There are governments which distinctly encourage the formation of great combinations in any particular field of commerce in order to maintain selling agencies and to extend long credits and to use and maintain the machinery which is necessary for the extension of business. American merchants feel that they are at a very considerable disadvantage in contending against that. The matter has been many times brought to my attention, and I have each time suspended judgment, because in this matter 'I am from Missouri' and I want to be shown how that combination can be made and conducted in a way which won't close it against the use of everybody who wants to use it. A combination has a tendency to exclude new members. When a group of men get control of a good thing they do not see any particular point in letting other people into the good thing. What I should like very much to be shown, therefore, is a method of co-operation which is not a method of combination, not that the two words are mutually exclusive, but we have come to have a special meaning attached to the word 'combination.' Most of our combinations have a safety lock, and you have to get the combination to get in. I want to know how these co-operative methods can be adopted for the benefit of everybody who wants to use them, and I say frankly, if I can be shown that, I am for them.

"If I cannot be shown that, I am against them, and I hasten to add that I hopefully expect that I can be shown that. You probably cannot show it to me offhand, but by the methods which you have the means of using you certainly ought to be able to throw a vast deal of light, because the minute you ask the small merchant, the small banker, the countryman, how he looks upon these things and how he thinks they ought to be

arranged in order that he can use them, if he is like some of the men in country districts that I know, he will turn out to have had a good deal of thought upon that subject and be able to make some very interesting suggestions whose intelligence and comprehensiveness will surprise some city gentlemen who think that only the cities understand the business of the country."

Municipal Plant Rejected in Duluth

Voters of Duluth, Minn., at a special election on Jan. 19, rejected an ordinance providing for the appropriation of $85,500 for the erection of a municipal plant to serve a district in West Duluth. They passed at the same election an ordinance providing a maximum rate of 6 cents per kw-hr. for electrical energy for the Duluth Edison Electric Company and rejected another ordinance providing for a maximum rate of 4 cents per kw-hr. The vote on the construction of the municipal plant was close. It stood 4652 opposed and 4335 in favor, giving an adverse majority of 317. An error is claimed in these figures which would reduce the majority against the plant to 270. There were 4391 votes in favor of a maximum rate of 6 cents per kw-hr. and 3860 votes for the rate of 4 cents per kw-hr. It is announced that the Duluth Edison Electric Company will introduce the 6-cent rate without delay.

The action arises from negotiations between the city and the company which have been under way for some months. The City Council passed a resolution on Aug. 7, 1914, offering to buy the property of the company at $1,107,940. This offer was refused. Thereupon an ordinance was passed providing for the appropriation of $85,500 for a municipal plant. On Oct. 10 prominent business men asked the City Council to make a contract for two years with the company, stating that the company would be willing to give a fair rate during that period. The city authorities refused, and a request for a referendum on the municipal plant was presented. Over 4000 voters signed a petition asking for a referendum on the proposed contract for a 6-cent rate. Later an ordinance was passed fixing a rate of 4 cents per kw-hr., and it was decided that the three ordinances should be put to the vote of the people on the same date. An active campaign followed and continued up to the night before election day.

Ohio Commissioners on Valuation

In speaking before a district meeting of the Ohio Independent Telephone Association at Columbus on Jan. 22, Mr. Charles E. Marshall, member of the Ohio Public Utilities Commission, expressed the belief that a more sane interpretation of the laws relating to supervision of public utilities must be made. Otherwise, he said, the incentive to create these properties and maintain and develop them will be lost, and such a loss will involve the service itself. Mr. Marshall said that the commission is a judicial body and that its duty is to protect companies as well as consumers. The requirement of the new utilities law that makes an appraisement of the 1500 or more service companies in the State necessary was criticised severely by the speaker. This will result in economic waste, and it is entirely unnecessary and in many cases will benefit no one. Some companies that will never have a rate controversy were compelled to pay out large sums of money for appraisements that will be of no value to them. Specific cases could be handled under the old law, and those companies that had no questions would have been saved the money they are compelled to pay out.

Mr. E. W. Doty, then a member of the commission, said that the appraisements will be valuable in bringing to light property the companies did not know they possessed. He urged utility men to make valuations in the itemized form provided by the commission. Mr. Doty complimented the committee of representatives of Ohio utility companies which established forms for appraising property, especially the portion pertaining to depreciation, and said that the report disposed of every other theory that had been advanced.

Mr. Lawrence K. Langdon, recently appointed counsel for the commission, said that regulation is bringing recognition of public utilities as natural monopolies. Legislation may be enacted in the near future which will encourage capital to invest in the State by vesting the commission with authority to prevent competition where there is no necessity therefor from a service standpoint. This will be a step in the interest of consumers as well as companies.

Electric Sign Regulations at Boston

A set of preliminary regulations relative to the installation of roof signs of electric and other types has been drafted by Metropolitan Fire Prevention Commissioner John A. O'Keefe, Boston, Mass. Among the requirements is a provision that every electric sign used on a roof shall be equipped with a conspicuously marked switch, easy of access, on the first floor of the building near the entrance. Mr. W. H. Blood, Jr., insurance expert of the National Electric Light Association, has sent a protest against this rule to the commissioner, pointing out that it increases the hazard and complicates present wiring regulations calling for the use of a main switch controlling the entire service of each building and incidentally governing the supply of energy to signs. Mr. Blood contended that the construction suggested increases the number of exposed wires and switches, that it adds materially to the cost of installation and is not in accordance with the National Electrical Code. At a public hearing the proposed regulations, which specify various details of construction and arrangement, were also opposed by Mr. G. H. S. Young, of the Boston Edison Company, and by Mr. Sheldon H. Wardwell, counsel for the Massachusetts Electric Lighting Association.

Order for Filing New York Rate Schedules Modified

The New York Public Service Commission, Second District, has modified its order directing that schedules of rates be filed by gas and electric properties. Companies and municipalities are to be allowed until March 15 to comply with the order, and the schedules may be typewritten on standard forms instead of printed. The expense of compliance with the order will be reduced materially, but all the information which the commission specified in its original order will be provided.

In a letter addressed to gas and electrical corporations and municipalities the Empire State Gas & Electric Association, through Mr. Charles H. B. Chapin, the secretary, mentions the modification of the order. The association has sent to each commercial and municipal plant a set of the seven forms approved by the commission. It also sent some general suggestions in regard to the preparation of the schedules and detailed explanations of the use of each of the forms. These suggestions and explanations have been submitted to, and meet the approval of, the chief of the bureau of tariffs of the commission.

The association will furnish without charge such number of each of the forms as may be necessary for

the properties in order that they may comply with the order. The letter adds:

"We are also prepared to assist you in the preparation of your schedule, to the end that when you finally file it with the commission it shall, as far at least as the form is concerned, be immediately acceptable without further correspondence or revision. If you so desire you can fill in one set of the forms, such as in your case will constitute a complete schedule, and send it to us for inspection and comment before submitting it to the commission. Probably, in the end, time and trouble would be saved by this method of procedure. We hope you will feel entirely free to ask about any matters which are not altogether clear, and we shall be glad to answer such questions promptly and to the best of our ability.

"Please understand that all statements in this letter apply to all gas corporations, electrical corporations and municipalities in the State, entirely independent of whether or not they are members of this association."

Western Society of Engineers Protests Against Criticism of Cooley Commission

The action of certain members of the Chicago City Council and of the Sanitary District of Chicago in officially rebuking Mr. John Ericson, city engineer, and Mr. William Artingstall, engineer for the harbor commission, for signing the report of the Cooley commission which recommended increases in rates for the hydroelectric energy sold by the Sanitary District to the city of Chicago for street-lighting purposes, was censured in an unusual resolution passed by the Western Society of Engineers, Chicago, at a meeting Feb. 1.

In the words of the resolution: "The engineer's first duty to his client is to tell him the truth, no matter where it may lead nor how unpalatable it may be. Engineering and engineering economics are subject to natural law, which cannot be altered to meet the whim of human nature. The most serious disgrace that can come to an engineer is to conceal, pervert or distort natural and economic law, either to please a client or to advance temporarily his interests and so ultimately to lead his client into difficulties. An experienced engineer of standing ranks as a confidential professional adviser, who feels keenly his responsibilities and whose integrity and conscientiousness when properly established should be appreciated and upheld by his client."

Mr. Lyman E. Cooley acted as chairman of the commission which made the report to the Sanitary District board, and Mr. L. K. Sherman was secretary.

Reduction in Motor-Service Rates in St. Louis

The Union Electric Light & Power Company of St. Louis, Mo., has announced a new schedule of rates for motor service, effective on Feb. 1. The minimum charge will be $50 a month for 1500 kw-hr. For energy in excess of that amount the rate will be 2 cents per kw-hr., less the regular discount for prompt payment. The reduction means a saving of from 5 per cent to 33 1/3 per cent to consumers of energy for motor service, depending upon their requirements. It is the intention to extend further reductions to all classes of service as rapidly as conditions permit.

Mr. A. C. Einstein, vice-president and general manager of the company, said that in the face of prevailing business conditions it has been found that requirements of many manufacturers having steam generating plans have been curtailed materially, thus making the operation of their steam plants for their more limited requirements rather expensive. Many of such installations, it has been found, seem willing to adopt electrical energy for motor service, as they, under the circumstances, find it more convenient, and, with the rates this reduction offers, more economical.

Messages of Governors on Public Utilities

In messages to the legislatures now beginning their sessions many governors of states refer to public utility affairs. In last week's issue we published extracts from the messages of the Governors of Illinois and Michigan. Abstracts from three other messages follow:

Governor Withycombe of Oregon

"Legislation permitting the establishment of hydroelectric power districts would tend, I believe, to a speedier development of the State. I would favor the creation of districts somewhat along the line of existing irrigation district procedure, whereby groups of individuals in a community may band together for the co-operative development of the water-power resources of their neighborhood. By such a pooling of interest and community bonding, so to speak, small communities and farmers could put to beneficial use natural resources now entirely wasted. The same method could also be applied in the reclamation of unimproved areas, notably stump and undrained land, by the establishment of some system of land-improvement districts."

Governor Curtis of Maine

"The dominant party is pledged to legislation for the development of our water-powers for the use of Maine, under such regulation as will be fair and reasonable toward private capital, while fully protecting all public interests, and to this end it favors careful and systematic protection of our vast timber areas. It denounces the public utility law as a measure designed to foster monopoly, rather than to protect the public interests, but, as it has received the sanction of the people by popular vote, it yields to their mandates."

Governor Kendrick of Wyoming

"The need of a public utilities commission in Wyoming is quite apparent, and since such a commission is urged by all of our political parties, the demand may be said to be universal, and the Legislature's responsibility is clear and conclusive. We must bear in mind that no greater injury could be done to the industrial life of our State at this time than to enact a law that might be used in a spirit of hostility against the corporations. The form of commission best adapted to the specific needs of Wyoming at her present stage of development is quite clear in my mind. I am aware that many of our sister states, in creating these commissions, have provided for salaried commissioners, either elective or appointive. The principal work of a commission of this nature is with the railroads and is confined to intrastate traffic, both passenger and freight. Since such traffic is comparatively light in our State, it is my conviction that an expensive commission would be extremely inadvisable. I would recommend, therefore, the creation of a commission to be composed of three of the elective State officers, such commission to be provided with a salaried secretary or rate expert, whose duty would be to provide full information for the use of the commission, who would be competent to make adequate investigations and recommendations to the commission and who would be able to initiate, with the approval of the commission, work of original inquiry. While this secretary should have unquestioned ability and integrity, he should not have a vote on the board."

Miscellaneous News Notes

Inspection Charges Differ Greatly.—A report recently presented before the Western Association of Electrical Inspectors shows a wide range in inspection charges scheduled in different cities. For example, a fifteen-lamp installation costs 50 cents in one city and $2.25 in another. Similarly, the charge for approving a 1-hp motor installation ranges from $1.50 to $6.75.

Proposed License Law at Cincinnati Dead.—O. K. Jones, chairman of the committee on law, contracts and claims of the Cincinnati City Council, has announced that indefinite postponement will be recommended for the proposed ordinance requiring electrical workers to be licensed. Strong opposition to the measure by various organizations and business houses caused the committee to take this action.

Central-Station Men of New Mexico to Organize.—A meeting of the representatives of various central stations in New Mexico will be held in Albuquerque Feb. 15 and 16 for the purpose of forming a state organization. The movement to form the association is being promoted by Manager A. F. Van Deinse, of the Albuquerque Gas, Electric Light & Power Company, and Superintendent C. M. Einhart, of the Roswell Gas & Electric Company.

City Responsible for Death of Lineman Working on Its Lines.—The Supreme Court of Iowa recently ruled (149 N. W., 616) that where it is the duty of a line foreman to de-energize a line before setting employees to work thereon failure to do so is an actionable negligence on the part of his master (the city in this case). Moreover, a lineman following his foreman's instructions to work on a line is justified in believing that the line is de-energized and cannot therefore be considered negligent.

Electrical Codes in Various Cities.—In answer to requests by the Society for Electrical Development regarding electrical codes employed, 319 municipalities have sent answers. Of these 131 had adopted the municipal code of electrical construction, 93 refer to the National Electrical Code, and 44 now have codes in preparation. A degree of success is now being attained in educating architects on electric-service topics, through the sale of a handbook, whereas the former free distribution of literature failed to interest the architect.

Huron, Ohio, Limits Its Municipal-Plant Expenditures.—Huron, Ohio, has fixed a limit upon monthly expenditures for its electric venture. Stating that no more drafts upon the light fund, which is now $4,500 overdrawn, would be allowed, the Council agreed to pay the plant $220 a month for street lights, and indicated that this sum, with receipts from domestic and other consumers would have to do. The board in charge of the plant estimates that the allowance will be sufficient, with the other revenue, to pay operating expenses, but not to pay interest on the investment or make any allowance for depreciation.

Municipal-Corporation Contract Must Accord with City Charter.—The Supreme Court of Oklahoma has recently decided (144 P., 1071) that an oral contract which was entered into by a commissioner on behalf of the city of Wagoner to furnish electricity is not binding on the city as the municipal charter provides that no contract shall bind the city unless signed by the mayor and countersigned by the city clerk. The case arose over the failure of the city to furnish electricity to the owner of a cotton gin after a verbal agreement thereto had been entered into by the commissioner of water, light and sewerage.

Demand for College Graduates Indicates Approach of Increasing Prosperity—Prof. P. B. Woodworth, who is in charge of the electrical engineering course and the employment department of Lewis Institute, Chicago, remarked to a representative of the ELECTRICAL WORLD that the demand for men had been increasing rapidly. Although between Oct. 1 and Jan. 15 the Lewis Institute employment department received almost no applications for men, since Jan. 15 more men have been requested than the Institute has been able to supply. Draftsmen, manual-training teachers and men with a general electrical training have been in greatest demand.

Mayor Baker on Cleveland Situation.—Mayor Newton D. Baker of Cleveland, Ohio, sent a communication to the City Council on Feb. 1, in which he advised against any attempt on the part of the city to purchase the property of the Cleveland Electric Illuminating Company until after the Public Utilities Commission has made a report on its appraisal. He asserted that the delay in completing this appraisal emphasizes the need of municipal regulation. The new municipal light plant, he said, will shortly have an income adequate to pay operating expenses, insure modern and efficient service, meet interest and depreciation charges and set by a surplus for betterments.

Cleveland Municipal Plant Appropriation.—The appropriation for the division of light of the city of Cleveland for 1915 amounted to $691,100. Included in this amount is a total of $141,400 for equipment. Among the items composing this total are the following: Meters and settings, $18,000; poles, line and transformers, $74,000; arc lamps, $10,000; service connections, $16,000; underground construction, $5,000. The appropriation for labor for operation is $75,000; for labor for maintenance it is $100,000; for supplies a total of $220,800 is given, and the largest item in this amount is $165,000 for fuel, light and power. For maintenance of equipment $70,300 is appropriated. The total estimated expenditure for 1914 was $520,276, a net increase over 1913 of $266,932.

Dissolution of Temporary Injunction Refused in Cincinnati.—The Superior Court of Cincinnati has overruled the application of the Union Gas & Electric Company for a dissolution of the temporary injunction granted the Diamond Light Company, restraining the Union company from interfering with wires and conduits of the Diamond company. The basis of the decision is the legality of the lease of the Diamond company on the basements through which its wires extend. This lease has been disavowed by the lessor in favor of a later lease to the Union company. The court held that it was not necessary to pass upon the question of whether the owner of the property could have the lease set aside, in view of its ruling on the right of the Union company to secure a similar lease in order to oust its rival.

Prominent Men Address Chicago Central Station Institute.—The Chicago Central Station Institute, conducted under the auspices of the Insull group of properties, has begun a series of evening lectures on engineering and commercial topics. Each course will continue with weekly addresses until June. A fee of $10 is charged for each course. On Feb. 1 Mr. Louis A. Ferguson, vice-president of the Commonwealth Edison Company, spoke on the development of the central station, and on Feb. 5 Mr. John F. Gilchrist was scheduled to discuss "The Working Organization of Public Utility Corporations." On Feb. 8 Mr. A. D. Bayley of the Edison company will speak on the generation of steam in power plants, and on Feb. 12 Mr. Frank F. Fowle, one of the receivers of the Central Union Telephone Company and a former associate editor of the ELECTRICAL WORLD, will discuss "The Theory of Organization in Utility Corporations." Mr. Fred R. Jenkins, 72 West Adams Street, Chicago, is in charge of the course.

Merchants' Association Opposes Federal Ownership.—Directors of the Merchants' Association of New York, on the recommendation of the committee on public utilities and law, have adopted a resolution recommending that the property of the New York Telephone Company in the entire State be appraised in connection with the revision of rates in New York City. The committee in its report says that the New York City property of the company is not used solely for local purposes but is used conjointly with the property of the company in other parts of the State for communication between New York City and areas elsewhere. Moreover, a very considerable part of the cost of supplying service is due to various capital and general expenses incident to the operation of the property as a whole. A true apportionment of the general and capital expenses can be made only by (1) ascertaining the aggregate of general and capital charges incident to the entire operations of the company; (2) ascertaining the value of all the company property; (3) computing the ratio of such aggregate general and capital expenses to the value of the entire property; (4) ascertaining the value of property used by any operating division and charging thereto its pro rata share of the aggregate general and capital expenses incurred in the operation of the company as a whole, as dictated by scientific methods of accounting.

Associations and Societies

New York Jovian Lunch Club.—Dr. William Torrence Stuchell spoke on "The New America" at the meeting of the New York Jovian Lunch Club held at the Hotel Martinique, New York, on Feb. 3.

Commonwealth Edison Section, N. E. L. A.—At the Jan. 26 meeting of the Commonwealth Edison Section of the National Electric Light Association Mr. P. Junkersfeld spoke on the subject "What Electricity Has Done and Can Do for Transportation in Chicago.' '

Meeting of Empire State Meter Committee.—A meeting of the meter committee of the Empire State Gas & Electric Association, to which all companies are invited to send representatives, will be held at the Technology Club, Syracuse, N. Y., on Feb. 10, beginning at 10 a. m. While various subjects will be discussed, the principal topic on the program will be methods of metering multiphase circuits.

Boston Section, A. I. E. E.—Mr. D. B. Rushmore, head of the power and mining department, General Electric Company, addressed the Boston Section of the A. I. E. E. on Jan. 22 upon the "Economics of the Electric Motor." In a comprehensive survey of the rise of power he emphasized the importance of instituting savings in distribution, where a kilowatt-hour gained is worth about three times as much as in the generating plant.

Philadelphia Meeting of the I. E. S. and A. I. E. E.—On Monday, Feb. 8, a joint meeting of the Philadelphia sections of the Illuminating Engineering Society and the American Institute of Electrical Engineers will be held at the Engineers' Club, 1317 Spruce Street, following a dinner at 6 p.m. Prof. George A. Hoadley will present a paper on "A Year's Progress in Illumination," and Mr. George H. Stickney will speak on "Recent Developments and Applications of Incandescent Lamps." There will be an exhibition of lamps at the meeting.

Independent Telephone Association at Minneapolis.—At the convention of the Independent Telephone Association of America held at Minneapolis, Minn., Jan. 19 to 21, Mr. E. B. Fisher, Grand Rapids Mich., was re-elected president of the association, and the following officers were named for the coming year: Vice-presidents, Messrs. E. D. Schade, Johnstown, Pa., and W. H. Bryant, Mobile, Ala.; secretary-treasurer, Mr. W. S. Vivian, 19 South La Salle Street, Chicago. The Minnesota Independent Telephone Association held its meeting at the same time.

Chicago Electric Club.—Addressing the Chicago Electric Club Jan. 28, Mr. C. S. Cutting, formerly probate judge in Chicago, likened the growth of federal and state regulation of business to the swing of a gigantic pendulum oscillating from one extreme of its path of travel, through its meridian, and across to the opposite extreme. Just now, he said, the pendulum has reached its zenith and has begun the backward sweep. Care must be exercised or it will again pass the meridian, wiping out all of the good which has been accomplished. The reason for the change in sentiment, the speaker said, is to be found in the fact that the cost of operating commissions is beginning to be seen upon the tax bills, so that the farmers and the voters in general have come to say: "We formerly got along pretty well without these commissions, and if they are so costly we believe we can do so again."

Electric Vehicles for Department-Store Delivery.—On Jan. 28 Mr. Edward Callan, of the Callan Department Store, Third Avenue and 121st Street, New York, read a paper entitled "Electric-Vehicle Performance in Department-Store Service" before the New York Section of the Electric Vehicle Association. Mr. Callan outlined the experiences of his concern with horse-drawn vehicles and with electric and gasoline cars. He declared that he favored the electric automobile because of its simplicity and economical operation. Besides, with electric vehicles no skilled mechanic is required, and it has been found that the skilled driver is not often a good delivery man. In order to encourage the drivers to be careful, Mr. Callan stated that his concern awards monthly bonuses to the men on whose cars the repair bills are small. Among those taking part in the discussion were Messrs. S. G. Thompson, E. L. Howland, D. C. Fenner, R. L. Lloyd and F. B. Fink.

Chicago Section, I. E. S.—"The Known and Unknown of Physical Light" was the title of an address in which Dr. C. H. Sharp, technical director of the Electrical Testing Laboratories, New York, reviewed some of the accepted theories of illuminating engineering before the Chicago Section of the Illuminating Engineering Society, Jan. 29. Speaking of the "unknowns," Dr. Sharp expressed the opinion that a means of producing cold light would sometime be discovered. Those who spoke in discussion of the paper were Messrs. W. A. Durgin, J. R. Cravath, E. H. Freeman, J. B. Jackson and F. A. Rogers, of Chicago, and F. A. Vaughn, of Milwaukee. At the next meeting of the society Dr. Nelson M. Black, of Milwaukee, will speak on what is known about vision.

Bill to Separate Electrical Work in Building Contracts.—The Electrical Contractors' Association of New Jersey at its ninth annual convention in Passaic, Jan. 23, indorsed a bill providing for the segregation of the electrical work from that of other parts of a building contract. It is proposed to have the bill introduced in the Legislature in the near future. The following officers were elected: President, Mr. E. P. Strang of Camden; vice-president, Mr. C. R. Newman of Passaic; treasurer, Mr. P. H. Jaehnig of Newark, and secretary, Mr. John Van Dyke of Asbury Park. Messrs. C. F. Adams of Trenton, R. P. Ward of Dover, C. R. Newman of Passaic, B. F. Sprague of Long Branch and H. C. Heidrick of Newark were elected to the board of directors. The speakers were Messrs. W. A. Cox, of the new-business department of the Public Service Electric Company; C. C. Harvinson, inspector of the Public Service Electric Company; H. H. Newman, manager of the Passaic district of the Public Service Electric Company; J. E. Alexander, of the General Electric Company; G. A. Collinson, of the New Jersey Underwriters' Association; Assistant Chief W. S. Gibson, of the Passaic Electrical Bureau; S. H. M. Agneus, of the Jovian Order, and T. S. Dorris, of Newark.

Western Association of Electrical Inspectors.—The tenth annual meeting of the Western Association of Electrical Inspectors was held at Minneapolis, Minn., Jan. 26 to 28. The meeting consisted chiefly of committee reports on the following subjects: "Induction Motors," by Mr. K. W. Adkins, Kansas City, Mo.; "Signal Systems," by Mr. J. R. Morrisey, Joliet, Ill.; "Underground Systems," by Mr. Guy W. See, Minneapolis, Minn.; "Electric Traction Systems," by Mr. Frank R. Daniels, Chicago; "Rubber-Covered Wire," by Mr. Victor H. Tousley, Chicago; "Laws and Ordinances," by Mr. W. S. Boyd, Chicago; "Revision of the National Electrical Code," by Mr. F. D. Varnam, St. Paul. Other interesting information was also presented in talks on "Elevator Motor Control," by Mr. George H. Malcolm, of the Otis Elevator Company, New York; on "A New Grounded-Case Fire-Box System," by Mr. F. F. Stover, Star Electric Company, Binghamton, N. Y.; on "Power Installations in Flour Mills," by Mr. C. Lang, superintendent of the Northwestern Milling Company, Minneapolis; on "Electrolysis," by Mr. Burton McCollum, of the United States Bureau of Standards, Washington, D. C.; on "Principles of Conduct and Character Which Attain Success in Human Affairs," by Mr. John S. Taylor, Minneapolis; on the "Label Service of the Underwriters' Laboratories," Chicago, by Mr. J. E. Latta, and on the "Service of the Society for Electrical Development," by Mr. G. B. Muldaur. Mr. J. S. Mahen, Chicago, presented a draft of proposed rules for carhouse wiring. The matter of preparing specifications for transformer rooms was referred to the commitee on architects' specifications. It was also announced that membership in the association is to be extended to wiring inspectors employed by central-station companies. The following is the list of officers elected for the coming year: President, Mr. H. M. Maxwell, Dayton, Ohio; vice-presidents, Mr. F. H. Moore, Indianapolis, Ind., and Mr. Emil Anderson, Minneapolis, Minn.; secretary-treasurer, Mr. W. S. Boyd, 175 West Jackson Boulevard, Chicago, Ill.; executive committee—Messrs. J. R. Morrisey, Victor H. Tousley, F. H. Moore, Charles Reasoner, K. W. Adkins, R. J. Swain and George Cotton. An elaborate entertainment program was carred out. At the banquet Wednesday evening Mr. W. I. Gray, Minneapolis, acted as toastmaster, and among those who spoke were Messrs. Waldemar Michaelsen, W. T. White and O. A. Rofelty.

Public Service Commission News

New York Commissions

The investigation by a committee of the Legislature into the New York Public Service Commissions was begun on Jan. 30, when the first hearing was held in the City Hall, New York City. Mr. Travis H. Whitney, secretary of the First District commission, was the first witness. He testified at length in regard to the affairs of the commission. In reply to questions he said that at present orders of the commission are being violated and actions have been taken to enforce them.

Mr. William Hayward, counsel to Governor Whitman, who is conducting the investigation, read an extract from the message of Governor Hughes on Jan. 2, 1907, dwelling upon the need of legislation for the regulation of public service corporations and emphasizing the idea that any commission that might be created should have power to proceed, upon its own motion, to correct abuses. Mr. Hayward asked if the commission had ever conferred with district attorneys of the various counties making up the city with a view to criminal prosecutions in cases of violation. Mr. Whitney said that he did not recall that any commissioner had ever so conferred with a district attorney.

Mr. George F. Daggett, head of the complaint bureau of the First District commission, was called as a witness on Feb. 1. He had had twenty-four years' experience in the post office inspector's department and with the commission, and declared that complaints were handled by the commission more efficiently and received more care and resulted in more insistent demands for redress than any he had ever known. Out of 8716 informal complaints, Mr. Daggett said that 3393 had been satisfied; no action was taken on 2201; 1342 were "ill-founded"; 230 were defaulted; 1338 were covered by formal hearings, and in 212 the commission had no jurisdiction. These complaints were against corporations other than gas and electric from 1910 to 1914, inclusive.

The First District commission has granted the petition of the Merchants' Association of New York to intervene in the Stadtlander and Ewoldt rate cases, which have been pending for some time against the New York Edison Company. Mr. Julius Henry Cohen said that the Merchants' Association believed that rates are unreasonable and profits excessive. The association believes, Mr. Cohen said, that the profits are not due to charges paid by small consumers but to the business done with large consumers. He declared that in certain cities in Canada where there is a municipal plant the private plants do a better business and have larger profits after the small consumers have gone to the municipal plant. He said that an appraisal of the property ought to be made.

Commissioner Maltbie, under whom an investigation has been in progress for about three years, has stated, although not officially, that he expected to report substantially in favor of the demands of the petitioners, who asked that the maximum rate be reduced from 10 cents per kw-hr. to 6 cents per kw-hr. Chairman McCall, after consultation with the other members of the commission, announced that the motion to intervene was granted and that an opportunity to introduce testimony was to be given to the association. The commission did not pass upon the question of appraisal. Commissioner Maltbie declared that it will take at least eighteen months to make an appraisal, and he opposes it on the ground of the delay that would be incurred.

The Second District commission has approved the exercise of franchises for furnishing electrical energy in the town of Claverack, Columbia County, by the Albany Southern Railroad Company, but restricts such exercise to the territory east of a line one mile west of the meridian numbered 70 deg. 40 min. on the United States Topographical Survey map of the town. The territory to the west of this line is reserved for the Chatham Electric Light, Heat & Power Company, which is now doing business there. Neither company can now do business in the territory of the other without first obtaining the permission of the commission, granted after a hearing of which the other company shall have been notified.

Ohio Commission

The city of Sandusky and the Sandusky Gas & Electric Company asked the commission to dismiss the appeal from the ordinance making rates. An agreement has been reached on the ordinance passed in 1913, making rates of 5 cents and 3 cents per kw-hr., and there was no need of further consideration by the commission.

The hearing in the case of the Cleveland Electric Illuminating Company against the 3-cent ordinance passed by the Cleveland Council has been postponed to March 31.

City Solicitor Walter M. Schoenle, of Cincinnati, appeared before the commission to urge the completion of the appraisal of the property of the Union Gas & Electric Company. Mr. L. G. White, who is in charge of the work, stated that the report should be ready in six weeks or two months and that good progress is being made. He said that it was found to be expedient to take the inventory of the company and investigate it instead of employing a large force to look up each separate piece of property. Chairman O. H. Hughes took exception to some of the questions asked by Mr. Schoenle and replied to recent statements of Mr. Schoenle which appeared in newspapers. In this work, he said, there will be neither needless delay nor unnecessary expense.

It is understood that bills will be introduced in the Legislature providing for a reduction in the salaries of members of the commission from $6,000 to $4,000 a year.

Pennsylvania Commission

The Municipal Home Rule League, which is back of the Graff-Maurer bill to repeal the Pennsylvania Public Service Commission act, has decided to offer another bill which would provide for a commission with limited powers. Under this plan there would be a commission of five men with duties restricted to the supervision of common carriers and other public utilities serving in the State at large. Local authorities would have jurisdiction over the affairs of local companies. At the meetings of the league it was pointed out that the expense of sending witnesses to Harrisburg to meet with the commissioners was so great in many cases that justifiable complaints could not be made.

In the matter of the petition of the Lehigh Navigation Electric Company for the approval of an ordinance in the borough of Wind Gap the commission approved the ordinance, which grants the right to erect high-tension wires over and across Broadway in that borough. The Pennsylvania Utilities Company filed a protest against the approval of the ordinance, stating that the proposed transmission lines are for the purpose of providing facilities and serving the public, not only in Plainfield Township, but also in Wind Gap Borough, Pen Argyl, Stroudsburg and East Stroudsburg, communities now served by the protesting company and other utility companies, and that there is no necessity for competing service. The commission announced that it wanted to have it understood that in issuing the certificates it expresses no approval of the use or occupation or entry upon any of the streets of the borough of Wind Gap by the Lehigh Navigation Electric Company for the purpose of furnishing service to or within the borough.

Wisconsin Commission

The Wisconsin Senate has confirmed the appointment of Mr. Carl D. Jackson, of Oshkosh, to succeed Mr. John H. Roemer on the Railroad Commission.

The name of Mr. Walter Alexander, of Milwaukee, has been sent to the Senate for confirmation as member of the Railroad Commission to succeed Mr. David Harlowe. For the last five years Mr. Alexander has been district master mechanic for the Chicago, Milwaukee & St. Paul Railway Company, with headquarters at Milwaukee. Previously he served on the faculties of the University of Wisconsin, Armour Institute and the University of Missouri.

The commission has authorized the Ironwood & Bessemer Railway & Light Company to issue $48,000 5 per cent bonds for the construction of a transmission line from Saxon Falls to Montreal.

The Wisconsin-Minnesota Light & Power Company has been empowered to issue $167,000 stock and $90,000 bonds to be applied to the capital account for expenditures made in acquiring the properties which have been added recently to the system.

Personal

Mr. C. W. Roselle, formerly electrical engineer of the Tri-County Light & Power Company, has been appointed local superintendent of the company at Woodhull, Ill., succeeding Mr. J. N. Lindell.

Mr. R. P. Benedict, chief engineer of the Northampton (Mass.) Electric Lighting Company, has tendered his resignation, effective Feb. 1, with the intention of locating elsewhere. As a mark of their appreciation, the employees of the company presented Mr. Benedict with a gold watch-chain and charm.

Mr. Walter P. Schwabe, general manager of the Northern Connecticut Light & Power Company, Thompsonville, Conn., has been elected vice-president of the Thompsonville Board of Trade. Mr. Schwabe is also president of the Thompsonville Water Company and general manager of the Windsor Water Company, Windsor, Conn.

Mr. Beecher W. Waltermire, of Findlay, has been appointed a member of the Public Utilities Commission of Ohio, to succeed Mr. E. W. Doty, whose term has expired. Mr. Waltermire is an attorney. His name had not been mentioned for the position and the announcement came as a surprise since several other men were avowed candidates.

Mr. Albert S. Scott has resigned as secretary-treasurer of the Public Service Company of Northern Illinois to establish an office as public accountant. Mr. Scott came to Chicago from England in 1909 and was appointed accountant with the Commonwealth Edison Company. Afterward he joined the staff of the Illinois Valley Gas & Electric Company and in 1911 became auditor of the Public Service Company of Northern Illinois, being promoted to the post of secretary-treasurer about twelve months ago.

Mr. E. P. Roberts, commissioner of smoke abatement, Cleveland, Ohio, resigned on Feb. 1 to reopen his office as consulting engineer. From 1893 to 1912 Mr. Roberts acted as consulting engineer for a large number of electric railroads, electric light and other public utility corporations and also many manufacturing plants. In addition he will now make a specialty of smoke abatement. He is a member of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, past-president of the Cleveland Engineering Society and an associate of the American Electric Railway Association.

Mr. W. R. Pinckard, the newly elected president of the Chicago Electric Club, was one of the charter members of the club and has always been closely identified with its activities. He is the Chicago manager of the detail and supply department of the Westinghouse Electric & Manufacturing Company, with which company he has been identified ever since January, 1898. Mr. Pinckard entered the electrical business in Chicago in 1887, where he has lived ever since. He possesses a wide circle of friends among members of the profession. One of his first duties after entering the employ of the Westinghouse company was selling watt-hour meters, a device unfamiliar to the electrical trade. The missionary work he did in this connection by always taking a sample with him and explaining its operation to the lighting companies of the Middle West was an important factor in winning companies over from a flat rate to a meter charge.

W. R. PINCKARD

Mr. Leon H. Scherck, who was recently elected president of the Eastern New York Section of the National Electric Light Association, is the general sales manager of the Central Hudson Gas & Electric Company of Poughkeepsie, N. Y. Mr. Scherck was born and educated at New Orleans, La., and attended Tulane University, receiving the degrees of B.S. and M.E. Immediately after leaving the university, Mr. Scherck became associated with the local Edison Electric Illuminating Company, in whose employ he remained for a period of seven years, rising from lamp repairer to assistant business manager. In 1903 he became associated with the banking house of I. Newman & Sons, as well as with the engineering firm of Ford, Bacon & Davis, and for six years represented these concerns in connection with a lighting interest throughout the South and Southwest. In 1909 Mr. Scherck became associated with the Newburgh (N. Y.) Light, Heat & Power Company and the Poughkeepsie (N. Y.) Light, Heat & Power Company, which afterward were the consolidated companies of the Central Hudson Gas & Electric Company.

Mr. Herbert A. Wagner, heretofore vice-president in charge of the electric division of the Consolidated Gas, Electric Light & Power Company of Baltimore, has been elected president of that organization in place of Mr. J. E. Aldred, who, however, retains his active interest in the company as chairman of the board. Mr. Wagner is a man of long experience in the utility field and has been identified with the Consolidated company since 1908. No small share of its great success has been due to his vigorous and effective work. Mr. Wagner is a native of New Jersey and a graduate of Stevens Institute, Hoboken. His first association with the Consolidated company was in 1908, when he undertook the direction of the electric division of the company's business, which has made great progress since that time. In 1911 he was elected a vice-president of the company. Mr. Wagner is second vice-president of the National Electric Light Association.

H. A. WAGNER

Mr. Arthur J. Cole, whose resignation as district manager of the Westinghouse Lamp Company of Chicago was announced in the ELECTRICAL WORLD Jan. 23, has taken a substantial financial interest in the McGraw Company, operating electrical and mill-supply jobbing houses at Sioux City and Omaha, and will become its vice-president and general sales manager. Mr. Cole was born in London, England, in 1882, and spent the early years of his life and secured his grade and high-school education in Ottawa, Ill. He spent a period of about three years in Montana in search of health and on returning to Ottawa completed his high-school education. In 1903 he entered Armour Institute, Chicago, taking up the study of electrical engineering. Shortly after leaving Armour Institute he entered the employ of Kohler Brothers, prominent electrical engineers and contractors in Chicago, as a clerk in the switchboard department. During his several years' connection with this concern he was successively manager of the different departments, and at the time of his resignation from that company he was sales manager. Upon his resignation from the firm of Kohler Brothers he was appointed district manager of the Westinghouse Lamp Company in charge of the Central West district, with main office at Chicago and sub-offices at Milwaukee, Minneapolis, Omaha and Kansas City, and in this connection he became very well acquainted with the large central-station and jobbing interests. In his new position with the McGraw Company Mr. Cole's technical and general electrical experience, gained during his connection with Kohler Brothers, combined with the merchandising experience gained while in charge of the Westinghouse Lamp Company's interests in the Central West, should be of great service.

A. J. COLE

Corporate and Financial

Escondido Utilities to Issue Notes.—The Escondido (Cal.) Utilities Company has been authorized by the California Railroad Commission to issue $29,000 notes for a period not to exceed two years.

San Joaquin Light & Power Bonds.—In reference to the $150,000 first refunding mortgage bonds of the San Joaquin Light & Power Corporation recently authorized by the California Railroad Commission, a supplemental order states that authority shall apply to bonds Nos. 4383 and 4394 to 4542 inclusive.

Greenville Light & Power Company to Purchase Property.—The Greenville Light & Power Company has been given permission by the Public Utilities Commission of Maine to purchase the Sangerville Improvement Company, the Sebec Power Company and the Dover (Maine) & Foxcroft Light & Heat Company.

Bucyrus Light & Power to Issue Bonds.—The Bucyrus (Ohio) Light & Power Company has been authorized by the Ohio Public Utilities Commission to issue $41,000 first mortgage 5 per cent bonds, of which $29,000 will be used to pay for construction, additions and extensions during the past three years and $12,000 for payment of obligations.

Coast County Gas & Electric to Renew Notes.—The California Railroad Commission has granted authority to the Coast County Gas & Electric Company to renew a promissory note for $15,000 held by the Bank of California National Association. The note shall extend not longer than six months and shall bear interest at a rate not exceeding 6 per cent.

Indiana Railways & Light Operations.—The comparative light and power revenues for the years ended Dec. 31, 1914 and 1913, are as follows:

	1914	1913
Operating revenue	$174,681	$151,038
Operating expenses	59,024	56,000
Net operating revenue	$115,657	$95,038

Ohio Traction to Issue Notes.—The Public Utilities Commission of Ohio has authorized the Ohio Traction Company to issue $1,500,000 of 6 per cent notes to run from one to five years. The proceeds of the issue are to pay for improvements that have been made to the property during the past three or four years and to take care of current indebtedness.

Western States Gas & Electric Bonds.—The California Railroad Commission in a supplemental order has authorized the Western States Gas & Electric Company to issue $93,500 first and refunding 5 per cent bonds, being part of an issue of $219,000 previously passed upon by the commission. The present order was necessary because the time of issuance in the original order had expired.

South Carolina Light, Power & Railway Preferred Stock.—A. B. Leach & Company of New York are offering at 95 the 6 per cent cumulative preferred stock of the South Carolina Light, Power & Railway Company of Spartanburg. The outstanding capitalization is now $3,000,000 first mortgage 5 per cent gold bonds, $700,000 6 per cent cumulative preferred stock and $2,500,000 common stock.

Northern Ohio Traction & Light Sells Bonds.—The Citizens' Savings & Trust Company of Cleveland, Ohio, has purchased $300,000 Northern Ohio Traction Company's consolidated mortgage 5 per cent bonds held in escrow to retire $300,000 of Akron, Bedford & Cleveland first mortgage 5 per cent bonds due on March 1. The entire $3,000,000 issue is now outstanding as a first mortgage.

Citizens' Light & Power to Issue Securities.—The Public Utilities Commission of Ohio has granted authority to the Citizens' Light & Power Company of Millersburg to issue $16,000 common stock and $10,000 first mortgage 6 per cent bonds at not less than par. The proceeds of the stock are to be used for the purchase of the Millersburg Electric Light Company, and the proceeds from the bonds are for additions, extensions, improvements and betterments to the property.

Montpelier & Barre Light & Power Bonds.—The stockholders of the Montpelier (Vt.) & Barre Light & Power Company have been offered the privilege of subscribing for $450,000 first and refunding mortgage 5 per cent thirty-year convertible gold bonds dated Oct. 1, 1914. The bonds are part of a $2,500,000 issue. The mortgage will require that $1,049,000 bonds be reserved for refunding underlying bonds, that $300,000 be reserved for use only in the acquisition of the property of the Waterbury Light & Power Company, Montpelier, Vt., and that $901,000 be held for extensions and improvements at 75 per cent of cost. The present $250,000 of bonds are convertible into 6 per cent cumulative preferred stock at par on and after the date of March 1, 1916.

Lawrence Gas Increases Stock.—The stockholders of the Lawrence (Mass.) Gas Company have been notified that the company has increased its capital stock from the par value of $1,900,000 to a par value of $2,500,000. Shareholders of record, June 4, 1913, on which date the increase was voted, may subscribe to the 6000 new shares at 140 at the rate of one share of new stock for every three and one-sixth old shares. Assignments of the right to subscribe for the new stock will be recognized by the company. The right to subscribe will expire Feb. 13, 1915, and subscriptions must be paid for by Feb. 17, 1915.

Mount Whitney Power & Electric to Issue Preferred Stock.—The Railroad Commission of California authorized the Mount Whitney Power & Electric Company to issue at not less than 95 $418,000 of 7 per cent cumulative preferred stock for the purpose of paying floating indebtedness. The company will issue this stock to its holding company, the Mount Whitney Power & Electric Corporation of New York, which will then issue its shares in corresponding amounts. The order of the commission provides further that the company may issue $750,000 common stock to cancel a like amount of preferred stock now outstanding.

New York Utility Growth.—Figures contained in the annual report of Public Service Commission of the Second District, New York, showed for all classes of light and power corporations an increase in operating revenue of 5.7 per cent for 1913 over 1912, an increase of 9.2 per cent in expenses and 10.9 per cent in taxes, and a decrease in operating income of 0.4 per cent. The figures show that the electric corporations are constantly gaining, that the gas departments of the gas and electric corporations are about holding their own, and that the gas corporations are showing a large decrease in net revenue owing to increased expenses and taxes.

Ohio & Western Utilities Company.—The Ohio & Western Utilities Company was incorporated in Delaware in November, 1914, and has taken over the Fort Scott & Nevada Light, Heat, Water & Power Company, Nevada, Mo., and the Chillicothe (Ohio) Electric Railroad, Light & Power Company. It is expected that the company will acquire many more properties. The outstanding capitalization consists of $1,000,000 common stock, $140,000 preferred stock, $565,000 6 per cent first lien bonds and $60,000 5 per cent first lien bonds. The officers are Messrs. P. W. Brooks, president; L. M. Symmes, vice-president and secretary, and E. H. Van Wick, treasurer.

Consolidated Light & Power Receivership Statement.—The Detroit (Mich.) Trust Company has sent to the creditors, stockholders and bondholders of the Consolidated Light & Power Company, Mount Pleasant, Mich., and the Chippewa Construction Company, an associated company, a short history of the work done in the past year by the receiver. The trust company was appointed receiver for both companies on Oct. 29, 1912. The gross income of the light and power company for the year ended Nov. 1, 1914, was $58,478, in comparison with $50,203 for the previous year. Expenses, exclusive of depreciation or fees, for 1914 amounted to $47,452 and in 1913 to $40,132, thus leaving a net income for 1914 of about $11,026 and for 1913 of $10,071. The Chippewa Construction Company is the owner of a portion of the high-tension line and some of the local distributing systems, and it is thought that in all probability the court will authorize a payment to it of a reasonable charge for the use of its property by the light and power company, and in that way reduce the net income of the operating company for both years. The receivers state that inasmuch as the consolidated company is serving inhabitants of a number of cities it will be necessary to use all the net

income to meet the expenditure necessary for maintenance, service and public demand. Since the appointment of receivers customers have increased 25 per cent.

Federal Sign System (Electric) Reduces Preferred Dividends.—Stockholders of the Federal Sign System (Electric) have been notified that the company will make no dividend payment on Feb. 1, 1915, thus leaving the dividend for the year 5¼ per cent. The directors believe it unwise to continue the present 7 per cent dividend rate, and so long as existing conditions continue they hold that dividends should not exceed 5 per cent per annum and that net earnings in excess of those required for the dividends should be kept by the company as working capital and to supply the necessary new money for rental investment purposes. The reason given for this step was the very great curtailment of purchases by electric utility companies, which are the company's principal customers.

Interstate Railways Preferred-Stock Plan.—The Interstate Railways Company of Camden, N. J., through President John A. Rigg, has asked preferred-stock holders to exchange their holdings for a like number of shares with the same par value without the redemption clause in order to make the same a permanent investment. The company was incorporated in December, 1902, with an authorized capital of $10,000,000, of which $2,291,050 was issued at par for money. The company acquired, for $10,776,600 of Interstate 4 per cent bonds, control of the United Power & Transportation Company, which operated railways and lighting companies in New Jersey, Pennsylvania and Delaware. Not having sufficient income in 1907, 1908 and 1909, the company defaulted its bond interest and, as a last resource, adopted a system of leases and issued $1,000,000 of preferred stock to meet the interest, holders of the coupons receiving payment in preferred stock. In a letter of March 28, 1913, Mr. Rigg stated that this issue had been authorized and over-subscribed and the 6 per cent dividends earned and paid. Inasmuch as the preferred stock was issued to the coupon holders, it was noted at this time that no dividends could be paid upon the common stock until the principal of the preferred stock had been fully paid, and for this reason the preferred-stock holders at that time were asked to exchange their holdings for preferred stock which would be permanent. Sufficient stockholders, however, did not consent to the plan, and it was abandoned temporarily. It is pointed out in the present letter of Mr. Rigg that after a period of five years the lessees have paid all obligations promptly and have expended about $4,500,000 in betterments and improvements.

Commonwealth Power, Railway & Light Annual Report.—The annual report of the Commonwealth Power, Railway & Light Company for the year ended Dec. 31, 1914, showed that the greatest advances were made in the electric service department. Sales of gas increased 4.03 per cent over 1913. Sales of electrical energy increased 7.72 per cent, the number of electric meters in use at the end of the year being 13.96 per cent more than in the previous year. The revenue from railway passengers decreased 1.23 per cent. The company had an output in 1914 of 208,490,680 kw-hr., against 193,544,665 kw-hr. in 1913. The company divided its percentage growth report into two parts, one showing the increase in the first seven months of 1914, the other the increase in the last five months of 1914, the period covered by the European war. In the first part of 1914 the gas sales increased 3.08 per cent, in the last part 2.71 per cent. Sales of electrical energy in the first part increased 8.4 per cent, in the last part 6.59 per cent. The railway passenger fares decreased 0.43 per cent in the first part and 2.33 per cent in the second part. The year 1914 was the first calendar year in which all of the companies (except Danville) had been together under one ownership. The following statement excludes all inter-company transactions:

Gross receipts	$14,006,484
Operating expenses	6,761,890
Gross income	$7,244,594
Fixed charges, including taxes and dividends on outstanding preferred stocks of underlying companies	5,000,860
Net income available for dividends, replacements and depreciation	$2,243,734
Dividends on preferred stock	960,000
Balance	$1,283,734

Manufacturing and Industrial

The Hydraulic Turbine Corporation, Camden, N. Y., is the new name for the concern formerly known as the Camden Water Wheel Works.

The American Manufacturers' Agency, Inc., Chicago, of which Mr. William H. McKinlock is president, has taken the selling agency for the Crawford Cedar Company of Menominee, Mich.

The Central Electric Company, Chicago, Ill., has appointed Mr. A. J. Sulzer, formerly in charge of the Chicago office of the Adams-Bagnall Electric Company, as its general sales manager.

Mr. Albert Scheible, who until recently was a member of the firm of patent attorneys, Lotz & Scheible, has opened an office at 1012 Rector Building and will continue the practice of patent law. Mr. Scheible is a mechanical and an electrical engineer.

Electric Company to Erect Office Building.—Within a short time the Lincoln Electric Company of Cleveland, Ohio, will let the contract for the construction of a three-story office building as an extension of its factory building at Kelley Avenue and East Thirty-eighth Street. It will cost about $10,000.

The Terry Steam Turbine Company, Hartford, Conn., has appointed Mr. E. F. Scott as its representative in the State of Georgia. Mr. Scott's offices will be at 702 Candler Building, Atlanta, Ga. The company's Pittsburgh office is now at 1624 Oliver Building and is in charge of Mr. H. A. Rapelye.

The Pettebone-Mingay Electric Supply Company, Niagara Falls, N. Y., which was recently formed, is in the business of house and factory wiring and electrical contracting. Mr. L. W. Pettebone is president of the company, Mr. L. A. Pettebone, formerly engaged in the hydroelectric work at Niagara Falls, N. Y., and in Ontario, is secretary, and Mr. C. P. Mingay, formerly electrical foreman at Niagara Falls, treasurer.

The Asbestos Wood Manufacturing Corporation, Poughkeepsie, N. Y., which was recently formed, is engaged in the business of manufacturing "Eterno" asbestos lumber and "Eterno" ebony boards. The company is making these products according to a patented process, using asbestos and cement as the principal ingredients. The products offer a high electrical resistance, it is declared, and will withstand a 2800-deg. (Fahr.) fire test.

Manhattan Electrical Supply Company Conference at Chicago.—Twenty-five salesmen of the staffs of the Manhattan Electrical Supply Company's Chicago and St. Louis offices held an all-week conference at the Hotel Sherman, Chicago, Jan. 18 to 23. The meetings were in charge of Mr. Clarke H. Methot, sales manager, 114 South Fifth Avenue, Chicago. On Thursday the members of the sales conference attended the luncheon of the Chicago Electric Club in a body.

Mr. Charles E. Poyer has been appointed assistant general sales manager of the Edison Storage Battery Company, Orange, N. J. Mr. Poyer has been with the Edison interests for about four years, having served first on the personal engineering staff of Mr. Edison in the development of special application of the alkaline battery and later as assistant advertising manager. For the last two years he has been manager of the house-lighting department, and the rapid development of this branch of the business from both an engineering and a commercial standpoint is attributable to his ability.

Cleveland Automobile Show.—A number of electrical concerns were represented at the recent automobile show at Cleveland, Ohio. The Baker Motor Vehicle Company exhibited two coupés, two broughams and two trucks; the Rauch & Lang Carriage Company, a brougham and a roadster; the Anderson Electric Car Company, two broughams and a cabriolet, and the Milburn Wagon Company, one coupé. Among the manufacturers of electrical accessories the following were represented: The Osgood Autolite Deflector Company, the Forest City Electric Company, the Electric Products Company and the Konsrv Electric Company.

Large Submarine to Be Built at Quincy.—The United States Navy Department has awarded a contract to the Electric Boat Company for the largest seagoing submarine ever built in the country and probably in the world. The craft will be constructed at the Fore River shipyard in Quincy, Mass., and will cost $1,350,000. It will have a displacement of 1000 tons, a radius of action of 3000 miles, a surface speed of 20 knots and a submerged speed of 11 knots. By the use of storage batteries alone the vessel will be able to travel under water for twenty-four hours. Seven smaller submarines for coast defence will also be built by the Electric Boat Company at a cost of from $427,000 to $460,000 each, the construction to be done at the yard of the Lake Torpedo Boat Company at Bridgeport, Conn., and also at Seattle, Wash.

Sales Force of Kansas City Jobber Meet.—The sales force of the B-R Electric & Telephone Manufacturing Company, Kansas City, Mo., assembled from various points outside the city, Saturday, Jan. 9, to hear discussions of the firm's selling policies. Four visiting representatives and one resident manager of other firms whose products are handled through the wholesale and retail departments of the B-R Company spoke to the salesmen assembled. The speeches chiefly concerned the products of each manufacturer and the best methods of promoting sales of the goods. Mr. F. E. Widwer represented the Brilliant Electric Company of Cleveland, Ohio, and Mr. H. M. Merrithew the American Ever-Ready Company. Mr. F. N. Boyer, district manager in St. Louis for the General Electric Company; Mr. W. M. Deming, manager of the supply department, and Mr. W. M. Hand, Kansas City manager of the same company, were also present. Mr. F. M. Bernardin, president of the B-R company, presided.

Orders for Electrical Equipment.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., reports receipt of the following orders: The Nevada Valley Power Company, Oakland, Cal., three 625-kva, single-phase outdoor transformers, three 400-kva, single-phase outdoor transformers, three 100-kva, single-phase outdoor transformers and three 37.5-kva, single-phase outdoor transformers; the Puget Sound Light, Power & Traction Company, Seattle, Wash., two 500-kva, three-phase outdoor transformers; the Philadelphia Electric Company, Philadelphia, Pa., four 300-kva, single-phase transformers; the Potomac Electric Company, Washington, D. C., one 150-kva, three-phase transformer; the Virginian Power Company, Charleston, W. Va., three 500-kva, single-phase outdoor transformers, three 250-kva, single-phase outdoor transformers, three 150-kva, single-phase outdoor transformers, three 100-kva, single-phase outdoor transformers and seven 75-kva, single-phase outdoor transformers; the Cushing Traction Company, Cushing, Okla., one 500-kw direct-current generator, one turbine equipped with reduction gear, condenser, etc., one three-panel switchboard, one 50-ton locomotive, two double-car equipments composed of motors, control and air-brake apparatus; and the Washington-Virginia Railway Company, Washington, D. C., a number of quadruple equipments including motors and control apparatus for interurban cars.

Experiences in South American Trade.—In talking with a representative of the ELECTRICAL WORLD on the subject of trade with the Latin-American republics, Mr. W. D. Steele, vice-president of the Benjamin Electric Manufacturing Company, Chicago, recounted that about five years ago that company united with two other American concerns in allied but not competitive lines in engaging a salesman to travel in South American countries. The salesman is a graduate of an American engineering college and speaks Spanish and Portuguese. He calls principally on importers and the jobbing trade in large centers, but also does some missionary work with central stations, dealers and consumers. Catalogs are printed in Spanish and Portuguese. The salesman spends from six to eight months of the year in the field. He devotes his time principally to Brazil, Argentina, Uruguay and Chile, but he also makes calls occasionally in other South American, Central American and West Indian countries. Mr. Steele said that it is possible that up to the present time better results might have been obtained had the same amount of time and money been expended in intensive cultivation of some parts of the United States. The people of the Latin-American countries are slow about changing their commercial relations. Once their confidence is obtained, however, it is hard to shake it. Therefore Mr. Steele thinks that the results of the work the company has been doing for the last five or six years, while fairly satisfactory now, will prove to be of much greater importance in the future. In the Spanish and Portuguese catalogs issued by the company all dimensions are given in the metric system, but for dimensions of stems and small threaded fittings English units are also given. Prices are not included in the regular catalog, but distributers are given separate price lists in which the list prices are given in American gold. This permits the use of the catalog in all South American countries, the distributer making his quotation to the trade in local currency. New editions of the foreign catalogs are issued about every two years. The catalogs are not so large as those circulated by the company in the United States. No trouble has been experienced in having them prepared and printed in Chicago in idiomatic Spanish and Portuguese. Customers' instructions are followed implicitly and packing is done with great care. As to credits, the company has not lost a dollar from South American customers in five years, and losses from other Latin-American countries have been small. In making sales dependence is placed largely on the salesman's judgment. The opinion of Mr. Steele is that, if reasonable care is exercised in extending credit, the percentage of losses from bad debts in the South American trade will not exceed the corresponding loss in the United States. A large proportion of the South American business of the Benjamin company is done at ninety days' sight. Very often the forwarding agents in New York arrange for the collections, and the remittance comes in the shape of a New York draft from the forwarding agent. However, collections are sometimes made through the Chicago banks. As to competition, it has been found, said Mr. Steele, that in the more ornate types of electric-lighting fixtures the French manufacturers have been the most active bidders for trade in the South American markets. In the simpler types of fixtures the Germans have obtained a large share of the business. The Edison screw-base lamp is used almost exclusively throughout South America; consequently the English have not figured very largely in the fixture trade there, their standard sockets being of the bayonet catch type. One feature of the international-trade situation in some South American countries that is worthy of attention has to do, Mr. Steele said, with the ownership of the electric-service companies. German capital controls a number of central-station utilities. In some cases it has been reported that central stations where German influence predominates have been reluctant to supply electrical energy for the operation of motors or large consuming devices coming from non-German sources. However, instances of this character have been few, and the objection was to non-German electric motors of considerable size, rather than to small appliances. Mr. Steele declared that the company would continue to develop its South American trade.

NEW YORK METAL MARKET PRICES

Copper	Jan. 26 Selling Prices Bid	Jan. 26 Selling Prices Asked	Feb. 2 Selling Prices Bid	Feb. 2 Selling Prices Asked
	£ s d		£ s d	
London, standard spot*	63 5 0		63 17 6	
Prime Lake	14.25	to 14.50	14.75	to 15.00
Electrolytic	14.12½	to 14.25	14.60	to 14.70
Casting	13.87½	to 14.00	14.25	to 14.50
Copper wire base	.....	to 15.50	15.75	to 15.87½
Lead	3.70		3.80	
Nickel	40.00	to 45.00	40.00	to 45.00
Sheet zinc, f.o.b. smelter	9.50		10.00	
Spelter, spot	.....	to 7.50†	8.00	to 8.12½†
Tin, straits	35.62½		38.00	
Aluminum, 98 to 99 per cent.	18.75	to 19.25	18.75	to 19.25

*OLD METALS

Heavy copper and wire	12.50	12.50
Brass, heavy	8.75	8.75
Brass, light	7.75	7.75
Lead, heavy	3.50	3.60
Zinc, scrap	5.25	5.37½

COPPER EXPORTS

Exports of copper in form of pigs, ingots, bars, plates, and scrap for week ended Jan. 23, 1915 ..... 1,689,614 lb.

*From daily transactions on the New York Metal Exchange.
†Nominal.

New Incorporations

The Southern Ohio Electric Central Station Company, of Athens, Ohio, has been incorporated with a capital stock of $10,000, by O. E. Harrison, H. C. Allread and others.

The Franconia Township Electric Light & Power Company, of Norristown, Pa., has been granted a charter with a capital stock of $5,000. The incorporators are C. N. Wagner, A. H. S. Cantlin and H. R. Fehr, all of Allentown, Pa.

Paul H. Jaehnig, Incorporated, of Newark, N. J., has filed articles of incorporation with a capital stock of $50,000 for the purpose of operating light, heat and power plants. The incorporators are P. H. Jaehnig, of Newark; F. H. Walsh, of East Orange, and L. W. Jaehnig.

The Electric Investment Company has filed articles of incorporation under the laws of the State of Delaware. The company is capitalized at $50,000 and proposes to generate and distribute electricity for lamps, heaters and motors. The incorporators are H. E. Latter, W. J. Maloney and O. J. Reichard, of Wilmington, Del.

The People's Hydroelectric Power Company, of Birmingham, Ala., has been incorporated with a capital stock of $20,000 for the purpose of constructing a hydroelectric power plant at the upper end of Wood's Island to develop the water-power of Ten Island Shoals, Whisenant and Leota Shoals on the Coosa River. The company purposes to supply electricity in Jefferson County and also in Gadsden, Anniston and Talladega. The officers are R. H. Cobb, of Birmingham, president; Clem Jowers, of Ohatchie, vice-president and treasurer, and S. H. Richardson, secretary.

New Industrial Companies

The Richman Protective Alarm Company, of New York, N. Y., has been incorporated by J. Richman, of Brooklyn; F. Wachtel and D. Wachtel, of New York. The company is capitalized at $10,000 and purposes to manufacture an alarm device for lock and electric machinery.

The Delta Electric Company, of Worcester, Mass., has been incorporated with a capital stock of $10,000 for the purpose of dealing in electrical machinery and apparatus, including generators, motors, lamps, etc. Henry H. Ham, 5 Barton Place, Worcester, is president and treasurer of the company.

The Campbell Lamp & Light Specialty Company, of Brooklyn, N. Y., has been incorporated by E. C. Abell, H. W. Van Allen and C. A. Campbell, 1450 President Street, Brooklyn. The company is capitalized at $15,000 and intends to manufacture and deal in fixtures, chandeliers and novelties.

The Newton Manufacturing Company, of New York, N. Y., has been chartered with a capital stock of $25,000 to manufacture and deal in electrical appliances, dynamos and motors. The incorporators are W. R. H. Hardingham, P. Sinnott and Bruce Falconer, 701 Madison Avenue, New York, N. Y.

The Godley Construction & Contracting Company, of Albany, N. Y., has been incorporated with a capital stock of $5,000 to manufacture electrodes, carbon, graphite, pencils, crucibles and accessories for electric furnaces. The incorporators are F. Angeloch, M. Wheeler and J. B. Kilburn, 608 138th Street, New York.

The Brooklyn Medical Battery & Instrument Company, of Brooklyn, N. Y., has been chartered with a capital stock of $6,000 to manufacture violet-ray and high-frequency current batteries and surgical instruments. The incorporators are G. P. Clauss, H. B. Hiergersell and P. W. Tunison, 1118 Bushwick Avenue, Brooklyn, N. Y.

The Electrical Contractors' Association, of Lynn, Mass., has been incorporated with a capital stock of $20,000 for the purpose of manufacturing and dealing in gas and electrical heating, lighting and power appliances, devices, attachments and machinery; also installing, altering and repairing same. Archibald T. Sampson, 434 Union Street, Lynn, is president, and Albra L. Waitt, 43 Baker Street, Lynn, is treasurer.

Trade Publications

Vacuum Cleaners.—The Atwood Vacuum Cleaner Company, Rockford, Ill., has issued a booklet describing its stationary vacuum-cleaning apparatus.

Transcontinental Telephoning.—"The Transcontinental Voice Highway" is the title of a folder just issued by the Western Electric Company, New York.

Wiring Devices.—Fish wire, outlet boxes for concrete work, conduit bushing adapters and hickey fixture hangers are described in Bulletins 25, 26, 27 and 28.

Single-Phase Motors.—The Century Electric Company, St. Louis, Mo., is sending out a folder which illustrates applications of its small single-phase motors.

Electrical Books.—Frederick J. Drake & Company, 1325 Michigan Avenue, Chicago, Ill., have issued a catalog describing a number of mechanical and electrical books.

Bushings for Flexible Tubing.—The Metal Specialty Company, Kansas City, Mo., has issued a leaflet containing information on bushings for non-metallic flexible tubing.

Electric Starter.—An electric starting device for used automobiles is the subject of a circular published by the F. Jos. Lamb Company, 940 Jefferson Avenue, Detroit, Mich.

Refillable Fuses.—Catalog No. 3, recently prepared by the Star Fuse Company, 448 Broome Street, New York, contains information on several types of refillable cartridge fuses.

Fire Extinguisher.—The Electric Operations Company, Bush Terminal, Brooklyn, N. Y., has published a circular which contains information on a recently developed fire extinguisher.

Electric House Pump.—Bulletin A-16 and a folder published by the Columbus Pump Supply Company, Columbus, Ohio, describe and illustrate several types of electrically operated house pumps.

Turbines.—"Turbines for Pump Drive" is the subject of a sixty-four-page illustrated catalog published by the Terry Steam Turbine Company, Hartford, Conn. The catalog is designated as Bulletin 19.

Magnet-Switch Starters.—Descriptive Leaflet 3767, issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., describes a magnet switch starter for alternating-current motors.

Anodes and Plating Salts.—The Munning-Loeb Company, Matawan, N. J., has issued Bulletin 600, which describes and illustrates various types of anodes for electroplating and different kinds of plating salts.

Machinery Paint.—"Machinery Finishes" is the title of a cloth-bound booklet being sent out by the Glidden Varnish Company, Cleveland, Ohio. The booklet contains samples of a number of different finishes.

Motors for Textile Mills.—The Crocker-Wheeler Company, Ampere, N. J., has issued a booklet entitled "Power Transmission in Textile Mills," which contains a reprint from "Silk Manufacturing and Its Problems," by James Chittick.

Electric Fans.—A number of types of electric fans being placed on the market by the Western Electric Company, New York, are described and illustrated together with other kinds of electrical apparatus in a catalog recently published.

Electrical Apparatus.—The Western Electric Company is sending out folders and catalogs on "Geyser" dish washers, "Chau-Phone" apparatus for closed automobiles, D & W oil fuse cut-outs, small rectifiers for ignition batteries, electric vibrators, intercommunicating telephone apparatus, telephone apparatus for apartment houses, and small lighting plants.

Wireless-Telephone and Wireless-Telegraph Apparatus.—The De Forest Radio Telephone & Telegraph Company, 101 Park Avenue, New York, has issued Bulletin C-14, entitled "One and Two-Step Audiophone Amplifiers and the Ultraudion"; Bulletin C-14, entitled "Audion Detector;" Bulletin A-15, entitled "Receiving Apparatus for Radio and High-Frequency Work," and Bulletin D-14, entitled, "Radiotelephone Apparatus."

Construction News

New England

MILLINOCKETT, MAINE.—Plans are being prepared, it is reported, by the Great Northern Paper Co. for the construction of a dam at the head of the Ripogenus gorge of the Penobscot River for the purpose of increasing the storage capacity above its mills, which are operated in large part by electricity (about 8000 hp in motors being used). The proposed dam will be 50 ft. high and several hundred ft. long.

FAYVILLE, MASS.—Plans and specifications for the power station to be erected at Fayville by the Metropolitan Water and Sewerage Board, it is said, are complete, and bids for turbine and electrical equipment will soon be asked by B. C. Thayer, chief electrician of the Wachusett power house in Clinton, who has charge of the work. Electricity generated at the plant, it is understood, will be used in Southboro.

LOWELL, MASS.—Plans have been submitted by the Lowell El. Lt. Corpn. to Mayor Murphy for the installation of an ornamental lighting system for the business district. The plans provide for the erection of 170 ornamental standards mounted with a single arc lamp maintained by underground wires.

EAST NORWALK, CONN.—A new central station has just been completed for the municipal electric-lighting plant, equipped with two Huttinger gas engines and gas producers. Elmer Lingard is superintendent.

LONG HILL, CONN.—Within the next six months H. A. House, Jr., proprietor of the local electric-light plant, expects to purchase appliances for lighting six houses and also electrical appliances and labor-saving devices for same.

Middle Atlantic

BROOKLYN, N. Y.—Bids will be received by the Park Board, Department of Parks, Municipal Building, New York, until Feb. 11, for furnishing and delivering one 2-ton motor truck at storehouse, Prospect Park, borough of Brooklyn. Blank forms may be obtained from Department of Parks, boough of Brooklyn, Litchfield Mansion, Prospect Park.

BROOKLYN, N. Y.—Bids will be received by the Board of Health of the Department of Health, corner of Centre and Walker Streets, New York, until Feb. 9 for furnishing and installing lighting, ventilation and moving pumps and all necessary alterations and all other work incidental thereto in the sewer tank building on the ground of the Kingston Avenue Hospital, borough of Brooklyn. Plans may be seen and blank forms and further information may be obtained at the office of the chief clerk of the Department of Health, corner of Centre and Walker Streets, New York.

CLAVERACK, N. Y.—The Public Service Commission has granted the Albany Southern R. R. Co., of Hudson, permission to furnish electricity in Claverack, but restricts the territory in which it can operate.

NEW YORK, N. Y.—An Australian firm which has been purchasing electrical switches from Germany desires to transfer its business to the United States and is in a position to ask for quotations on duplicates of the German switches. Full particulars concerning the switches and their manufacture can be obtained from the Bureau of Foreign and Domestic Commerce, Room 409, United States Custom House, New York, N. Y.

NEW YORK, N. Y.—Bids will be received by Marcus M. Marks, president borough of Manhattan, at the offices of the commissioner of public works, Room 2032, Municipal Building, New York, until Feb. 8 (for furnishing and installing the lighting fixtures in the Children's Court Building, situated at 137 East Twenty-second Street, borough of Manhattan. Blank forms, specifications and plans may be obtained at the office of Crow, Lewis & Wickenhoefer, architects, 200 Fifth Avenue, New York.

MEADVILLE, PA.—The City Council is considering plans for the installation of an ornamental lighting system on Water and Chestnut Streets. It is also proposed to improve the lighting system in outlying portions of the city.

PITTSBURGH, PA.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until March 11, for the installation complete of an electric passenger elevator in the experimental station, Bureau of Mines, Pittsburgh, Pa. For details see proposal columns.

TRENTON, N. J.—Plans are being considered by the City Commission, it is reported, to double the number of street lamps in the business section of the city. The present plans provide for 104 nitrogen lamps of 600 cp.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Feb. 16, for furnishing at the various navy yards and naval stations the following supplies: Mare Island, Cal., Schedule 7834—nine pneumatic motor hoists. Port Royal, S. C., Schedule 7861—two fire-tube boilers. Boston, Mass., and Brooklyn, N. Y., Schedule 7865—eight water-tube boilers. Washington, D. C., Schedule 7872—two silent-chain drives; Schedule 7872—miscellaneous steel shafting, couplings, etc., 1000 ft. flexible copper tubing. Norfolk, Va., Schedule 7863—miscellaneous steel-wire rope; Schedule 7882—four deck battery covers; Schedule 7884—miscellaneous nickel-chromium resistance wire; Schedule 7879—6000 lb. brass tubing. Brooklyn, N. Y., Schedule 7873—miscellaneous indicator and telegraph systems; Schedule 7881—miscellaneous lighting and power wire, miscellaneous rubber-covered wire, 37,700 ft. telephone wire. Philadelphia, Pa., Schedule 7878—miscellaneous sheet copper. Charleston, S. C., Schedule 7879—miscellaneous copper pipe, 3200 lb. brass tubing. Portsmouth, N. H., Schedule 7865—miscellaneous boiler tubes; Schedule 7879—miscellaneous composition unions. Boston, Mass., Schedule 7876—miscellaneous malleable-iron unions. Bids will also be received at the same place until Feb. 23 as follows: East and West, Schedule 7829—3000 lb. tubular gasket material. Puget Sound, Wash., Schedule 7867—one vertical simplex pump. Bids will also be received at the same place until March 2 for the following supplies: Pearl Harbor, H. T., Schedule 7828—miscellaneous voltmeters, wattmeters and watt-hour meters. Bids will also be received until Feb. 9 as follows: Mare Island, Cal., Schedule 7820—six exhaust portable fans. Brooklyn, N. Y., Schedule 7856—300 standing lamps; Schedule 7850—850 lb. material for blading for turbines. Norfolk, Va., and Charleston, S. C., Schedule 7847—miscellaneous circular B. & S. wire gages. Portsmouth, N. H., Schedule 7824—one Roentgen X-ray machine. Annapolis, Md., Schedule 7825—one turbine pump. Washington, D. C., Schedule 7839—miscellaneous carbon vanadium. Applications for proposals should designate the schedule desired by number.

WASHINGTON, D. C.—Foreign trade opportunities are announced by the Bureau of Foreign and Domestic Commerce in the Commerce Reports as follows: No. 15,419—An American consular officer in the Near East has transmitted a report relative to an opportunity to secure contracts for the installation of an extensive telephone system. A copy of the complete report may be had on application to the Bureau of Foreign and Domestic Commerce or its branches. No. 15,427—An American consul in Canada reports that an engineering and contracting company in his district wishes to get in touch with American manufacturers of a surface condenser to take care of three high-pressure engines on a dredge. Catalogs, etc., are desired. No. 15,429—A business man in Spain informs an American consul that he wishes to communicate with American manufacturers of copper wire, tubes, bars and sheet copper. Prices and catalogs should be sent immediately. Correspondence should be in Spanish. No. 15,473—An American consular officer in Italy reports that a firm in his district desires to communicate with American manufacturers of electrical machinery, fixtures and supplies. Correspondence should, if possible, be in Italian. No. 15,475—A commercial traveler with engineering experience has informed an American consular officer that he desires to obtain an exclusive agency for sale of American goods in Spain. He is interested in gas, gasoline, kerosene and crude-oil engines, pumps and pumping machinery, electric motors, and miscellaneous tools and accessories. He will travel at his own expense and proposes to assume all accounts of his customers. No. 15,482—A dealer in sporting goods, etc., in France, has informed an American consular officer that he wishes to receive catalogs and price lists on pocket electric lamps and sewing machines. Correspondence should be in French. Further information may be obtained on application to the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., or its following branches: United States Custom House, New York, N. Y.; Oliver Building, Boston, Mass.; Federal Building, Chicago, Ill.; Third National Bank Building, St. Louis, Mo.; Post Office Building, Atlanta, Ga.; Hibernia Bank Building, New Orleans, La.; United States Custom House, San Francisco, Cal., and Alaska Building, Seattle, Wash.

North Central

DETROIT, MICH.—Six electric elevators will be installed in the new 23-story addition to the Penobscot Building. Donaldson & Meier are architects.

DETROIT, MICH.—The erection of large power plants by the city for the benefit of small manufacturers who are unable to pay high rentals is advocated by H. A. Jones, of the H. A. Jones Realty Co.

HILLSDALE, MICH.—Bids will be received by the Board of Public Works until Feb. 24 for one 300-hp and one 350-hp boiler and stokers for same. J. C. Hanson is manager of the municipal electric-light plant.

OXFORD, MICH.—The Edison Illg. Co. of Detroit has submitted a proposal to the City Council offering to purchase the municipal electric-light plant for $20,000.

WHITEHALL, MICH.—The Frugale Pwr. Co., of Whitehall, expects within the next three months to erect about 5 miles of high-tension, single-phase transmission line; also to purchase within the next six months water turbines, from 500 hp to 1000 hp, and waterwheel governors. F. H. Speese is vice-president and manager.

ANDOVER, OHIO.—The Village Council has granted John Lore, of Mars, Pa., a franchise to install and operate an electric-lighting plant in Andover.

CLEVELAND, OHIO.—Plans are being prepared by the Municipal Lighting Department to extend the ornamental lighting system on Euclid Avenue as far east as East Twenty-second Street, and cables are now being laid. The cost of the system is estimated at $200,000.

CLEVELAND, OHIO.—Bids will be received at the office of the commissioner of purchases and supplies, 511 City Hall, Cleveland, until Feb. 12, for fiber conduit for the Municipal Electric Light Department. Specifications may be obtained at the office of the commissioner of light and heat division, 1443 East Third Street, Cleveland.

CLEVELAND, OHIO.—Bids will be received at the office of commissioner of purchases and supplies, 511 City Hall, Cleveland, until Feb. 10 for piping, valves, etc., in connection with 1000-kw turbine for the Municipal Electric Light Department. Specifications may be obtained at the office of the commissioner of light and heat division, 1443 East Third Street.

DAYTON, OHIO.—The city of Dayton has awarded the Dayton Pwr. & Lt. Co. the contract to furnish electricity to operate the new garbage destructor plant now under construction a few miles from the city.

DAYTON, OHIO.—Electrical power equipment, motor and wiring will be required in the construction of a five-story building to be erected for the Vaile Kimes Co., of Dayton, which manufactures pumps, trolley equipment, etc. H. W. Kimes has charge of the work.

DODSONVILLE (R. F. D. HILLSBORO), OHIO.—A movement has been started to secure the installation of an electric-lighting system in Dodsonville. It is proposed to procure energy from the traction company to operate the system. Henry Orebaugh is interested in the project.

EAST PALESTINE, OHIO.—The City Council has authorized the Board of Trustees of Public Affairs to purchase new equipment for the municipal electric-lighting plant. The new machinery will nearly double the output of the plant.

GALION, OHIO.—Preparations are being made by the Galion Iron Wks. & Mfg. Co. to install an electric light and power plant at its works on South Street. Work on the building will begin as soon as the weather will permit.

HILLSBORO, OHIO.—An agreement has been reached between the Village Council and the Hillsboro Lt. & Fuel Co. for lighting the streets of the village. Under the terms of the contract the company is to furnish 156 nitrogen lamps, of which 16 are to be 250 cp and the remainder of 100 cp, the fixtures to be provided by the company and the lamps by the Council. The village has been without street-lighting service for several months.

INDEPENDENCE, KY.—Negotiations are under way between the City Council and the Union Lt., Ht. & Pwr. Co., of Covington, with a view of establishing an electric-lighting system in Independence.

LAWRENCEBURG, KY.—A committee has been appointed to secure funds for the installation of an ornamental street-lighting system in the business district. D. L. Moore, Jr., is a member of the committee.

COLUMBIA CITY, IND.—The Wabash Valley Utilities Co., of Fort Wayne, has submitted a proposal to the City Council offering to supply electricity to operate the municipal lighting system. The company

offers to erect a high-tension transmission line from Fort Wayne to the corporate limits of Columbia City. At the present time the Council is considering a proposition to enlarge the municipal electric plant, including the installation of new boilers and machinery, to cost approximately $25,000.

GARRETT, IND.—Bids will be received by the City Council, Garrett, Ind., until March 4 for furnishing and installing one 200-kva, three-phase, 60-cycle, 2300-volt, 200-r.p.m., steam-engine-driven generating unit, with exciter, switchboard and other accessories, at the municipal electric-lighting plant. Proposals should state separate and combined price of engine, generator and accessories. W. W. Mountz is city clerk.

HUNTINGBURG, IND.—The Huntingburg El. Lt. Co. has sold its plant and holdings to the city of Huntingburg, to be transferred Feb. 27. Within the next three months the city expects to erect a new power house and install two boilers, one engine and generator and feed pump; also to purchase switchboard, exciter and protective devices; one car load of poles, several miles of No. 6 wire, several 10-kw transformers and one tub transformer, and all kinds of electrical household devices and supplies. F. G. Katterhenry is secretary of the Huntingburg El. Lt. Co.

MARTINSVILLE, IND.—Within the next 30 days the Martinsville Gas & El. Co. expects to purchase a new 250-kw alternating-current generator, and to change the system from direct current to alternating current within the next two months. The direct-current line will be retained for consumers using electricity for power purposes. J. H. Stewart is secretary and general manager.

WARREN, ILL.—The Warren Lt. & Pwr. Co. is planning to erect a transmission line from Warren to Apple River and to install a distributing system there. A substation, of the pole type will be installed in Apple River. G. W. Scheidecker, general manager, has charge of the work.

WILMETTE, ILL.—The installation of a new street-lighting system is under consideration by the Council.

ASHLAND, WIS.—The Wisconsin Railroad Commission has granted the Ironwood & Bessemer Ry. & Lt. Co., of Ashland, permission to issue $48,000 in bonds, the proceeds to be used for the erection of a transmission line from Saxon Falls to Montreal, Mich.

JANESVILLE, WIS.—Plans have been prepared for the installation of a new street-lighting system in the business district.

POYNETTE, WIS.—The Turtle Lake El. Lt. & Pwr. Co. has changed its name to the Poynette El. Co. and its location to Poynette.

NASHWAUK, MINN.—Steps have been taken by the Great Northern Pwr. Co., of Duluth for the erection of its proposed transmission lines from Hibbing to Nashwauk, work on which will begin early in the spring. The company will supply electricity to several mines in this section.

OSSEO, MINN.—Bonds to the amount of $9,000 have been voted for the installation of a municipal electric-lighting plant. W. C. Buck, 4821 Fremont Avenue South, Minneapolis, is engineer.

LARCHWOOD, IA.—Bids, it is reported, will be received at once for the construction of an electric-lighting plant in Larchwood, for which bonds were recently voted.

SIOUX CITY, IA.—Extensive improvements involving an expenditure of about $50,000, it is reported, are contemplated by the Sioux City Gas & El. Co.

ALTAMONT, MO.—Application has been made to the Council for a franchise to install an electric-lighting system in Altamont.

PLEASANT HILL, MO.—The installation of an electric-lighting system in Pleasant Hill is under consideration.

SENTINEL BUTTE, N. D.—The installation of an electric-lighting system is reported to be under consideration. For further information address the Sentinel Butte Commercial Club.

ABERDEEN, S. D.—The Aberdeen Ry. Co., it is reported, is contemplating the construction of an electric lighting and power plant. The company, it is understood, will soon apply to the City Council for a franchise. The company now secures energy from the Aberdeen St. Ry. Co.

FLANDREAU, S. D.—The Flandreau Lt. & Pwr. Co. is planning extensions to its power plant and system, including the installation of a 150-hp producer-gas engine, one 100-kva, three-phase, 60-cycle, 2300-volt generator and two 15-kva, 13,200-volt transformers. The distribution system will require 9 miles of overhead line, including poles and line material and 50 meters. A. H. Savage, 1003 Commerce Building, St. Paul, Minn., is engineer in charge of the work.

GREAT BEND, KAN.—Plans for the proposed ornamental street-lighting system provide for the erection of 55 ornamental standards carrying incandescent lamps, to be maintained by underground wires.

WINNFIELD, KAN.—Bids will be received at the office of the city clerk, Winnfield, until Feb. 19 for furnishing a 500-kw turbo-generator, condenser and auxiliaries and switchboard. For details see proposal columns.

Southern States

DUKE, N. C.—Preparations, it is reported, are being made by the Ervin Cotton Mill Co., of Duke, to install a large electric plant.

SPRING HOPE, N. C.—The East Carolina Pwr. & Lt. Co., it is said, contemplates a water-power development about 3 miles from Spring Hope. The company has been granted a franchise to supply electricity in this city and has also submitted a proposal to furnish electricity in Nashville.

ANDERSON, S. C.—The development of water-power on Eighteen-Mile Creek to generate 100-hp is contemplated by J. J. Fretwell; also the construction of a roller and corn mill and gin. The cost of the entire project is estimated at about $10,000.

CUTHBERT, GA.—The Electric Light and Water Commissioners expect to purchase within the next 12 months a 125-kw generator and a 14-in. by 15-in. Harrisburg engine, directly connected, and also one voltage regulator. E. A. Turner is superintendent.

OCILLA, GA.—Within the next two months the city of Ocilla expects to purchase two carloads of poles and give the distribution system a general overhauling. Roy J. Wilson is superintendent.

CAMDEN, TENN.—The local electric-lighting plant, owned by J. S. Madrey & Sons, was recently destroyed by fire.

CUMBERLAND GAP, TENN.—The Cumberland Mountain Mineral Co., recently incorporated with a capital stock of $100,000, contemplates the construction of electric plant and developing mines. Among the incorporators are G. W. Montgomery, Henry Spilker and J. D. Temlin.

OZARK, ALA.—Improvements to the municipal electric-light plant and waterworks system are nearly completed. All equipment for extension has been purchased. A water purifier for the boilers may possibly be needed in the near future. B. C. Dowling is superintendent.

CLARKSDALE, MISS.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Feb. 25, for installation complete of an electric passenger elevator in the United States post office and court house at Clarksdale, Miss. For details see proposal columns.

STEPHENS, ARK.—The Arkansas Lt. & Pwr. Co. is reported to be contemplating the installation of an electric-lighting system in Stephens. Energy to operate the plant will be obtained from Camden.

WOLFE CITY, TEX.—The Wolfe City Lt. Co., recently organized, has purchased the plant of the Wolfe City El. Lt. & Pwr. Co. The new company will purchase energy to operate the system from the Wolfe City Milling Co. Thomas J. Kelly is secretary.

Pacific States

TACOMA, WASH.—The Commissioners of Pierce County have granted the Puget Sound Trac., Lt. & Pwr. Co., of Seattle, a franchise to erect a transmission line into the Fife District.

TOPPENISH, WASH.—The Pacific Pwr. & Lt. Co. contemplates considerable extension work in this locality and contiguous territory, which will be started as soon as the weather will permit. An immediate extension will be made along South G Street to supply electricity for lamps and pumps for irrigation purposes in that section and also on to the Indian Reservation for the same purpose.

BAKER, ORE.—The City Council has decided not to enlarge the municipal electric-light and power plant to supply electricity to private consumers, the Eastern Oregon Lt. & Pwr. Co. having consented to make a reduction in its rates.

GRANTS PASS, ORE.—The Rogue River Pub. Ser. Corpn., of Grants Pass, is building a new power plant at Gold Hill, Ore. The plant will be equipped with three 400-hp turbines (already purchased), operating under 22-ft. head, General Electric generators, 1050 kva, three-phase, 60-cycle (purchased); switchboard equipment for a 750-kva generator and 3000 ft. of armored duplex cable will be required. Specifications for transformers and substation equipment have not yet been completed. Robert E. Gaut, of Chicago, Ill., and F. W. Dodge, of Gold Hill, are engineers in charge of the work. George W. Soranson is secretary of the company.

LEXINGTON, ORE.—Plans are being considered by J. B. Sparks, of Lexington, for the installation of a small electric-light and power plant to supply electrical service in this city and surrounding territory.

MOLALLA, ORE.—The Portland Ry., Lt. & Pwr. Co. has applied to the City Council for a franchise to supply electricity in Molalla.

LONG BEACH, CAL.—The contract for the installation of an ornamental street-lighting system on the principal business streets has been awarded to Woodill & Hulse El. Co., of Los Angeles. The plans provide for the erection of 247 cast-iron standards carrying one 60-watt and four 20-watt tungsten lamps, to be maintained by underground wires. The total cost of the system will be $25,415.

LOS ANGELES, CAL.—The contract for the lighting fixtures for the new depot at the foot of Fifth Street has been awarded by the Southern Pacific Company to the Meyburg Co., of Los Angeles, at about $10,000.

LOS ANGELES, CAL.—Bids will be received at the office of the United States Reclamation Service, Federal Building, Los Angeles, Cal., until Feb. 12, for furnishing electrical apparatus for small power plant, Elephant Butte dam, Rio Grande project, N. M. For particulars address United States Reclamation Service, Los Angeles, Cal., or Washington, D. C.

PASADENA, CAL.—Property owners on South Marengo Avenue have asked the City Commissioners to start proceedings under the Vroman act for the installation of an ornamental lighting system on the avenue from Colorado Street to Glenarm Street. A petition has also been received for lamps on the section of Marengo Avenue north from Colorado Street to Washington Street.

POMONA, CAL.—Plans have been approved by the City Council for an ornamental lighting system for the business section of the city. The plans provide for the installation of standards carrying three-lamp clusters.

DEARY, IDAHO.—The Council has granted a franchise to Roy Drury, of Deary, to install and operate an electric-lighting system here. A small plant, it is understood, will be installed in the plant of the Deary Lumber Co. to supply energy for the system.

FORT BENTON, MONT.—Bonds to the amount of $50,000 have been sold by the city of Fort Benton, of which the proceeds of $17,000 will be used for the purchase of the electric plant of the Fort Benton El. Lt. Co. The city, it is understood, will build a new system.

CANON CITY, COL.—The Arkansas Valley Ry., Lt. & Pwr. Co., of Canon City, is contemplating the installation of an ornamental street-lighting system or a curb-lighting system. W. N. Clark is local superintendent.

FORT LUPTON, COL.—Within the next three months the Fort Lupton Lt. & Pwr. Co. expects to erect 3 miles of transmission lines. W. C. Sterne is general manager.

FORT MORGAN, COL.—Within the next three months the town of Fort Morgan expects to purchase one 200-kva alternating-current generator and engine for the municipal electric-lighting plant. George G. Cox is superintendent of water and light plant.

WELLINGTON, COL.—The installation of an electric-lighting system in Fort Collins is reported under consideration. It is proposed to secure energy to operate the system from the plant in Fort Collins.

Canada

WETASKEWIN, ALTA.—Owing to the rebuilding of the Alberta government telephone system throughout the town the distributing system of the municipal electric-lighting system will have to be rebuilt. The cost of the work is estimated at about $8,000.

ST. JOHN, N. B.—Estimates for maintaining the lighting department for the coming year are placed at $35,102, which includes the installation of 50 new lamps, to cost $3,700.

TORONTO, ONT.—Contracts have been awarded by the Toronto Suburban Ry. Co. for the construction of three substations on its Toronto to Guelph line, at Islington, Georgetown and Guelph. The Georgetown

station will have an output of 1000 kw, in two 500-kw units, while each of the other two stations will be equipped with a single 500-kw unit, with provision made for installation of a similar unit in the future. Energy will be received at 25,000 volts, and will be stepped down and delivered to the line at 1500 volts.

UHTHOFF, ONT.—The Ontario Stone Corpn. has engaged M. S. Wollard to take charge of the installation and operation of the electrical plant at its quarries at Uhthoff.

Miscellaneous

KETCHIKAN, ALASKA.—Bids will be received at the office of the lighthouse inspector, Ketchikan, Alaska, until March 10, for furnishing two internal-combustion engines and air compressors and two internal-combustion hoisting engines for Cape St. Elias light station, Alaska. Blank proposals and particulars may be obtained upon application to the above office.

PANAMA.—Bids will be received at the office of the general purchasing officer, the Panama Canal, Washington, D. C., until Feb. 18, for furnishing dynamite, safety fuse, blasting caps, detonators, electric motors, rack pinion quills, cable bells, electric valves, rubber tubing, insulating tape, etc. Blanks and general information relating to this circular (No. 900) may be obtained from the above or the offices of the assistant purchasing agents, 24 State Street, New York, N. Y.; 614 Whitney-Central Building, New Orleans, La., and 1086 North Point Street, San Francisco, Cal. Major F. C. Boggs is general purchasing officer.

Directory of Electrical Associations

ALABAMA LIGHT AND TRACTION ASSOCIATION. Secretary-treasurer, H. O. Hanson, Mobile Gas Co., Mobile, Ala.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Permanent secretary, L. O. Howard, Smithsonian Institution, Washington, D. C. Meeting, San Francisco, Aug. 2-7.

AMERICAN ELECTRIC RAILWAY ASSOCIATION. Secretary, E. B. Burritt, 29 West 39th St., New York.

AMERICAN ELECTROCHEMICAL SOCIETY. Secretary, Prof. J. W. Richards, Lehigh University, South Bethlehem, Pa.

AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Secretary, Eugene W. Stern, 101 Park Ave., New York City.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Secretary, F. L. Hutchinson, 33 West 39th St., New York. Board of directors meets monthly. Sections and branches in the principal electrical centers throughout the country.

AMERICAN PHYSICAL SOCIETY. Secretary, Prof. A. D. Cole, Ohio State University, Columbus, Ohio.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS. Secretary, William H. Ross, 154 Nassau St., New York City.

AMERICAN SOCIETY FOR TESTING MATERIALS. Secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS. Secretary, Edwin A. Scott, 29 West 39th St., New York.

ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS. Secretary, W. J. Tharp, Little Rock, Ark.

ASSOCIATION OF EDISON ILLUMINATING COMPANIES. Assistant secretary, Walter Neumuller, Irving Place and 15th St., New York.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. Secretary, W. T. Snyder, McKeesport, Pa.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS. Secretary-treasurer, Jos. A. Andreucetti, Chicago & Northwestern Railway, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS. Secretary, P. W. Drew, 112 West Adams St., Chicago.

CALIFORNIA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, W. S. Hanbridge, 1408 Merchants' National Bank Building, Los Angeles, Cal.

CANADIAN ELECTRICAL ASSOCIATION. Affiliated with N. E. L. A. Secretary-treasurer, Alan Sullivan, 10 Adelaide Street East, Toronto, Can.

COLORADO ELECTRIC LIGHT, POWER AND RAILWAY ASSOCIATION. Secretary-treasurer, T. F. Kennedy, 900 15th St., Denver, Col.

COMMERCIAL SECTION, N. E. L. A. Secretary, J. F. Becker, 130 East 15th St., New York.

EASTERN NEW YORK SECTION, N. E. L. A. Secretary, C. S. Van Dyck, Schenectady, N. Y.

ELECTRICAL CONTRACTORS' ASSOCIATION OF MASSACHUSETTS. Secretary, H. D. Temple, 30 Foster St., Worcester, Mass.

ELECTRICAL CONTRACTORS' ASSOCIATION OF NEW YORK STATE. Secretary, Geo. W. Russel, Jr., 25 West 42d St., New York.

ELECTRICAL CONTRACTORS' ASSOCIATION OF STATE OF MISSOURI. Secretary, A. J. Burns, 318 West Tenth St., Kansas City, Mo.

ELECTRICAL CONTRACTORS' ASSOCIATION OF THE STATE OF PENNSYLVANIA. Secretary, M. G. Sellers, 1518 Sansom St., Philadelphia, Pa.

ELECTRICAL CONTRACTORS' ASSOCIATION OF WISCONSIN. Secretary, Albert Petermann, 626 Lloyd St., Milwaukee, Wis.

ELECTRICAL SALESMEN'S ASSOCIATION. Secretary, Francis Raymond, 125 Michigan Ave., Chicago, Ill.

ELECTRICAL SUPPLY JOBBERS' ASSOCIATION. General secretary, Franklin Overbagh, 411 South Clinton St., Chicago, Ill. Next meeting, Chicago, March.

ELECTRICAL TRADES ASSOCIATION OF CANADA. Secretary, William R. Stavely, Royal Insurance Building, Montreal, Can.

ELECTRICAL TRADES ASSOCIATION OF THE PACIFIC COAST. Secretary, Albert H. Elliott, Harding Building, 34 Ellis St., San Francisco, Cal. Meeting, San Francisco, second Thursday of each month.

ELECTRIC VEHICLE ASSOCIATION OF AMERICA. Executive secretary, A. Jackson Marshall, 29 West 39th St., New York. Sections in New York, New England, Chicago, Philadelphia, Washington and Los Angeles.

EMPIRE STATE GAS AND ELECTRIC ASSOCIATION. Secretary, Charles H. B. Chapin, 29 West 39th St., New York.

GAS, ELECTRIC AND STREET RAILWAY ASSOCIATION OF OKLAHOMA. Secretary-treasurer, Prof. H. V. Bozell, Norman, Okla.

GEORGIA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, J. M. Clayton, Atlanta.

ILLINOIS STATE ELECTRICAL ASSOCIATION. Secretary, H. E. Chubbuck, Peoria, Ill.

ILLUMINATING ENGINEERING SOCIETY. General secretary, C. A. Littlefield, 29 West 39th St., New York.

INDEPENDENT TELEPHONE ASSOCIATION OF AMERICA. Secretary, W. S. Vivian, 19 South LaSalle St., Chicago.

INDIANA ELECTRIC LIGHT ASSOCIATION. Secretary, Thomas Donahue, Lafayette, Ind.

INDIANA STATE ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, George Skilman, Indianapolis, Ind.

INSTITUTE OF OPERATING ENGINEERS. Secretary, L. Houmiller, 29 West 39th St., New York.

INSTITUTE OF RADIO ENGINEERS. Secretary, E. J. Simon, 71 Broadway, New York.

INTERNAL COMBUSTION ENGINEERS' ASSOCIATION. President, Charles Kratsch, 416 West Indiana St., Chicago. Meeting second Friday of each month at Lewis Institute.

INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Secretary, C. R. George, Houston, Tex.

INTERNATIONAL ENGINEERING CONGRESS. Secretary-treasurer, W. A. Cattell, Foxcroft Building, San Francisco, Cal. Congress, San Francisco, September.

INTERNATIONAL ELECTROTECHNICAL COMMISSION (international body representing various national electrical engineering societies contributing to its support). General secretary, C. le Maistre, 28 Victoria St., Westminster, London, S. W., England. Meeting at San Francisco, Sept. 9-11.

IOWA SECTION, N. E. L. A. Secretary, W. H. Thomson, Des Moines, Ia. Annual meeting, Keokuk, Ia., April 20-22.

IOWA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, M. T. Humphrey, Waterloo, Ia.

IOWA STREET AND INTERURBAN RAILWAY ASSOCIATION. Secretary, H. E. Weeks, Davenport, Ia.

JOVIAN ORDER. Jupiter (president), Homer E. Niesz, Chicago, Ill.; Mercury (secretary), E. C. Bennett, Syndicate Trust Building, St. Louis, Mo.

KANSAS GAS, WATER, ELECTRIC LIGHT AND STREET RAILWAY ASSOCIATION. Secretary-treasurer, Ivor Thomas, 237 South Main St., Wichita, Kan.

LOUISIANA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, J. J. Ziegler, 227 Bourbon St. Meeting every Wednesday, Audubon Building, New Orleans.

MAINE ELECTRIC ASSOCIATION. Secretary-treasurer, Walter S. Wyman, Waterville, Maine.

MICHIGAN ELECTRIC ASSOCIATION. Affiliated with N. E. L. A. Secretary, Herbert Silvester, 18 Washington Boulevard, Detroit, Mich.

MINNESOTA ELECTRIC ASSOCIATION. Secretary-treasurer, F. A. Otto, St. Paul Gas Light Company, St. Paul, Minn. Annual meeting, St. Paul, March 23-25.

MISSISSIPPI ELECTRIC ASSOCIATION. Affiliated with the National Electric Light Association. Secretary-treasurer, H. F. Wheeler, Hattiesburg, Miss. Annual meeting, Hattiesburg, April 12-14.

MISSOURI ELECTRIC, GAS, STREET RAILWAY AND WATER WORKS ASSOCIATION. Secretary-treasurer, F. D. Beardslee, Union Electric Light & Power Co., St. Louis.

NATIONAL ARM, PIN AND BRACKET ASSOCIATION. Secretary, J. B. Magers, Madison, Ind.

NATIONAL ASSOCIATION OF ELECTRICAL INSPECTORS. Secretary-treasurer, Wm. L. Smith, Concord, Mass.

NATIONAL DISTRICT HEATING ASSOCIATION. Secretary, D. L. Gaskill, Greenville, Ohio.

NATIONAL ELECTRIC LIGHT ASSOCIATION. Executive secretary, T. C. Martin, Engineering Societies Building, 33 West 39th St., New York. Annual meeting, San Francisco, June 7-11.

NATIONAL ELECTRICAL CONTRACTORS' ASSOCIATION OF THE UNITED STATES. Secretary, George H. Duffield, 41 Martin Building, Utica, N. Y. Annual meeting, San Francisco, July 18-24.

NATIONAL ELECTRICAL CREDIT ASSOCIATION. Secretary, Frederic P. Vose, 1343 Marquette Building, Chicago.

NATIONAL FIRE PROTECTION ASSOCIATION. Secretary of electrical committee, Ralph Sweetland, 141 Milk St., Boston, Mass. Open meeting, New York, March.

NATIONAL INDEPENDENT TELEPHONE ASSOCIATION. Permanent headquarters, Room 204, Hotel LaSalle, Chicago, Ill.

NEBRASKA SECTION, N. E. L. A. Secretary-treasurer, S. J. Bell, David City, Neb.

NEW ENGLAND ELECTRICAL CREDIT ASSOCIATION. Secretary, Alton F. Tupper, 60 State St., Boston, Mass.

NEW ENGLAND SECTION, ELECTRIC VEHICLE ASSOCIATION OF AMERICA. Secretary, L. L. Edgar, 39 Boylston St., Boston, Mass.

NEW ENGLAND SECTION, N. E. L. A. Secretary, Miss O. E. Bursiel, 149 Tremont St., Boston, Mass.

NEW YORK ELECTRIC RAILWAY ASSOCIATION. Secretary, Charles C. Dietz, 365 East 21st St., Brooklyn, N. Y.

NORTHWEST SECTION, N. E. L. A. Secretary, N. W. Brockett, Pioneer Building, Seattle, Wash.

NORTHERN WHITE CEDAR ASSOCIATION. Secretary, R. N. Boucher, 743 Lumber Exchange, Minneapolis, Minn.

OHIO ELECTRIC LIGHT ASSOCIATION. Secretary, D. L. Gaskill, Greenville, Ohio.

OHIO SOCIETY OF MECHANICAL, ELECTRICAL AND STEAM ENGINEERS. Secretary, Prof. F. E. Sanborn, Ohio State University, Columbus, Ohio.

OREGON ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary-treasurer, J. W. Oberender, Portland, Ore.

PENNSYLVANIA ELECTRIC ASSOCIATION (State Section N. E. L. A.). Secretary-treasurer, H. N. Müller, Pittsburgh, Pa.

RAILWAY SIGNAL ASSOCIATION. Secretary-treasurer. C. E. Rosenberg, Times Building, Bethlehem, Pa.

SOCIETY FOR ELECTRICAL DEVELOPMENT, INC. General manager, J. M. Wakeman, 29 West 39th St., New York. Annual meeting, New York, May 11, 1915.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Secretary, Dean F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa. Annual meeting, Ames, Ia., June 22-25.

SOUTHEASTERN SECTION, N. E. L. A. Secretary-treasurer, Geo. H. Wygant, Tampa, Fla.

SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION. Secretary, H. S. Cooper, 405 Slaughter Building, Dallas, Tex.

VERMONT ELECTRICAL ASSOCIATION. Secretary-treasurer, C. H. West, Rutland, Vt.

WESTERN ASSOCIATION OF ELECTRICAL INSPECTORS. Secretary, W. S. Boyd, 76 West Monroe St., Chicago, Ill.

WESTERN SOCIETY OF ENGINEERS, ELECTRICAL SECTION. Secretary, J. H. Warder, 1737 Monadnock Block, Chicago.

WISCONSIN ELECTRICAL ASSOCIATION. Secretary, George Allison, 1410 First National Bank Building, Milwaukee, Wis.

Weekly Record of Electrical Patents

UNITED STATES PATENTS ISSUED JANUARY 26, 1915.

[Prepared by Robert Starr Allyn, 16 Exchange Place, New York, N. Y.]

1,125,936. ELECTRIC SAFETY APPLIANCE; C. A. Benedict, Bellvale, N. Y. App. filed Jan. 25, 1913. For protecting telephone and like apparatus from static electricity.

1,125,947. INDICATOR FOR PARTY-LINE TELEPHONES; E. Bowman, Elmwood, Ontario, Canada. App. filed July 23, 1912. Sounding device operated when third party lifts receiver from hook.

1,125,948. ELEVATOR SAFETY DEVICE; T. T. Boyle, Detroit, Mich. App. filed Aug. 27, 1913. Prevents car starting before door is closed.

1,125,952. SWITCH SUPPORT; H. H. Brown, Passaic, N. J. App. filed March 14, 1914. Bracket on steering column supports horn button adjacent to steering wheel.

1,125,954. TELEPHONE-EXCHANGE SYSTEM; S. H. Browne, Pittsburgh, Pa. App. filed Dec. 19, 1904. Incoming calls grouped and forwarded to attendants in manner to be most expeditiously handled by them.

1,125,965. AUTOMATIC SWITCHING SYSTEM; E. H. Clark, Austin, Ill. App. filed Jan. 20, 1908. Includes main office or offices supplemented by one or more outlying "sub-offices."

1,125,970. PRIMARY BATTERY; H. Csanyi, New York, N. Y. App. filed May 14, 1913. Non-leaking but provided with a vent.

1,125,971. IGNITION APPARATUS FOR INTERNAL COMBUSTION ENGINES; I. J. Daily, Indianapolis, Ind. App. filed Jan. 21, 1913. Furnishes spark at any speed so that battery for starting can be dispensed with.

1,125,997. SELECTIVE SIGNALING SYSTEM; J. C. Field, Orange, N. J. App. filed Aug. 23, 1912. Special condenser combination.

1,126,007. ELECTRIC SIGNALING APPARATUS AND CIRCUITS; E. B. Herzog (deceased), New York, N. Y. App. filed April 8, 1889. For use in hotels, etc.

1,126,009. SELECTIVE SIGNALING DEVICE; R. N. Hill, Montclair, N. J. App. filed Aug. 7, 1912. Has novel arrangement of circuit-closing ratchet wheel.

1,126,016. ELECTRIC-CURRENT ECONOMIZER; W. L. Imlay, New York, N. Y. App. filed Jan. 2, 1914. Includes a brush carried by a rotary member and movable into contact with distributer only upon attainment of proper speed.

1,126,027. APPARATUS FOR DETECTING PIPE LEADS OR OTHER METALLIC MASSES EMBEDDED IN MASONRY; M. Jullig, Vienna, Austria-Hungary. App. filed Nov. 25, 1913. Includes opposing coils acting inductively on each other.

1,126,043. CIRCUIT CONTROLLER; A. C. Livermore, Edgewood Borough, Pa. App. filed March 12, 1913. Contact finger is positively locked in any one of its three positions.

1,126,046. TELEPHONE SYSTEM; F. R. McBerty, New Rochelle, N. Y. App. filed Feb. 27, 1908. Combines the best features of the automatic system and of the manual system (fifty-two claims).

1,126,047. TELEPHONE-EXCHANGE SYSTEM; F. R. McBerty, New Rochelle, N. Y. App. filed Nov. 16, 1909. Control of automatic selectors by revertive impulses.

1,126,048. TELEPHONE SWITCHING APPARATUS; F. R. McBerty, New Rochelle, N. Y. App. filed Feb. 27, 1908. For automatic systems (forty-five claims).

1,126,059. POWER-TRANSMISSION SYSTEM; W. Morrison, Des Moines, Ia. App. filed Aug. 12, 1913. For automobiles; dynamo between engine and transmission acting as electromagnetic clutch.

1,126,060. CENTRIFUGALLY REGULATED POWER TRANSMISSION SYSTEM; W. Morrison, Des Moines, Ia. App. filed Sept. 18, 1913. Electromagnetic clutch assisted by centrifugally operating mechanical friction clutch elements.

1,126,061. DYNAMO-ELECTRIC CLUTCH; W. Morrison, Des Moines, Ia. App. filed Sept. 18, 1913. One of the rotors of the electromagnetic clutch carries centrifugally operating friction-clutch elements.

1,126,079. CASTING METALS OF HIGH MELTING POINT; A. L. J. Queneau, Philadelphia, Pa. App. filed June 19, 1909. Metal melted in electrically heated crucible and forced by pressure up through nozzle into the mold.

1,126,692. AUTOMATIC SECTION SWITCH; W. Schaake, Pittsburgh, Pa. App. filed March 13, 1911. Operated by trolley of passing car.

1,126,095. TRANSMITTING APPARATUS FOR SUBMARINE SIGNALS; J. Schiessler, Vienna, Austria-Hungary. App. filed May 12, 1909. Large number of comparatively weak syntonized separate impulses employed; electrical waves sent out simultaneously with the sound waves.

1,126,122. ELECTRIC-RAILWAY SAFETY SYSTEM; M. Strang, Tecumseh, Mich. App. filed July 29, 1912. Sections of third rail are segregated in case of danger.

1,126,143. RESILIENT DRIVING CONNECTION; J. E. Webster, Pittsburgh, Pa. App. filed May 27, 1912. Between motor and car wheel of street cars.

1,126,145. SIGNAL APPARATUS; W. H. Wells and J. R. McCumber, Victoria, Va. App. filed Feb. 28, 1914. For giving "stop-over" signals to engineer; alarm sounds when stop-over station is reached.

1,126,163. SYSTEM OF ELECTRIC-MOTOR CONTROL; W. Cooper, Pittsburgh, Pa. App. filed Dec. 21, 1910. Arrangement of accelerating switches.

1,126,173. TELEPHONE-EXCHANGE SYSTEM; J. L. Wright, Cleveland, Ohio. App. filed Nov. 13, 1907. Semi-automatic.

1,126,178. TRAIN-SIGNAL SYSTEM; W. E. Benn, McAdam Junction, New Brunswick, Canada. App. filed Jan. 30, 1914. Air-brake hose sections carry the conductors.

1,126,184. AUTOMATIC-STORAGE BATTERY LIGHTING SYSTEM; C. A. Dawley, Plainfield, N. J. App. filed March 14, 1913. For maintaining constant voltage on external circuit.

1,126,193. SPRING-JACK; O. M. Glunt, Rutherford, N. J. App. filed Aug. 28, 1913. Rigid, compact and readily attached construction.

1,126,198. CONTROL SYSTEM FOR ELECTRIC MOTORS; A. J. Hall, Wilkinsburg, Pa. App. filed Feb. 17, 1913. Pneumatically operated multiple-unit type.

1,126,199. FIRE-ALARM TRANSMITTER; W. R. Hamilton, Montreal, Quebec, Canada. App. filed April 12, 1913. Single transmitter for both the alarm and trouble signals.

1,126,200. FIRE-ALARM TRANSMITTER MOVEMENT; W. R. Hamilton, Montreal, Quebec, Canada. App. filed April 12, 1913. Has two tripping magnets of different resistances.

1,126,206. RAILWAY SIGNALING SYSTEM; L. A. Hawkins, Schenectady, N. Y. App. filed Nov. 8, 1911. Alternating-current normal danger system with minimum number of live wires.

1,126,211. PROCESS AND MEANS FOR SECURING METALLIC COATS ON CERAMIC SURFACES; L. Heller, Teplitz, Austria-Hungary. App. filed March 24, 1914. Metal electrodeposited on graphite composition coating.

1,126,221. SWITCH-LATCHING MECHANISM; E. H. Jacobs, Schenectady, N. Y. App. filed Aug. 19, 1911. Rotatable actuating shaft locked in either switch-closed or switch-open position.

1,126,266. IGNITING SYSTEM; H. G. Osburn; Pittsburgh, Pa. App. filed May 22, 1911. Dual spark-generating equipment.

1,126,267. OUTLET FIXTURE; H. T. Paiste, Philadelphia, Pa. App. filed Aug. 2, 1909. For attaching snap switches, etc., to conduit fixtures.

1,126,272. SIGNAL; A. G. Remhilt, Philadelphia, Pa. App. filed Oct. 25, 1913. Vehicle rear signal.

1,126,286. ALTERNATING-CURRENT MEASURING INSTRUMENT; F. W. Roller, East Orange, N. J. App. filed Jan. 30, 1914. Measures currents or voltages over wide ranges.

1,126,295. PRIMARY BATTERY; A. L. Saltzman, East Orange, N. J. App. filed Aug. 14, 1912. All elements suspended from cover of jar.

1,126,311. MOTOR CONTROL SYSTEM; G. E. Stack, Schenectady, N. Y. App. filed July 31, 1912. Includes a dynamic brake.

1,126,334. HIGH-FREQUENCY ALTERNATOR; E. F. W. Alexanderson, Schenectady, N. Y. App. filed July 17, 1912. Telephone relay or reinforcer.

1,126,339. PRINTING TELEGRAPH SYSTEM AND ALPHABET; C. G. Ashley and J. B. Crippen, Chicago, Ill. App. filed June 17, 1909. Prints composite characters.

1,126,363. ALTERNATING-CURRENT MOTOR; D. M. Bliss, West Orange, N. J. App. filed March 13, 1911. Self-starting synchronous motor operating on single-phase circuit.

1,126,369. BY-PASS FOR INCANDESCENT-ELECTRIC-LAMP CIRCUITS; E. and N. R. Booth, Halifax, England. App. filed Dec. 26, 1913. Applied to the base of the lamp.

1,126,394. ELECTRIC CORD PLUG; T. F. Clark, West Hoboken, N. J. App. filed June 27, 1914. The two parts of the base interlock by transverse movement.

1,126,422. STORAGE BATTERY; R. Drambourg and J. E. Reid, New York, N. Y. App. filed June 19, 1913. Single-cell battery of almost unlimited voltage.

1,126,434. CONTROLLER FOR ELECTRIC CIRCUITS; A. F. Feller, Berkeley, Cal. App. filed Dec. 9, 1913. For gas machines, compressors and the like.

1,126,455. ELECTRIC SNAP SWITCH; H. H. Hansen, Chicago, Ill. App. filed Jan. 11, 1912. Indicating dial structure.

1,126,459. BLOCK-SIGNAL SYSTEM; L. A. Hawkins, Schenectady, N. Y. App. filed Nov. 26, 1909. Alternating current; reduced number of live wires.

1,126,483. RELAY AND METHOD OF OPERATING SAME; C. Kinsley, Chicago, Ill. App. filed Aug. 30, 1909. For high-speed telegraphy.

1,126,494. ELECTRIC SWITCH; M. Levison, Chicago, Ill. App. filed July 17, 1911. For signaling from bedside of hospital patient.

1,126,546. BRUSH HOLDER; E. Mattman, Norwood, Ohio. App. filed July 27, 1906. Brush resiliently held against commutator.

1,126,594. ROTOR FOR MOTORS; W. G. Viall, Bridgeport, Conn. App. filed March 9, 1912. Stamped up from sheet metal.

1,126,608. TOY RAILWAY; P. H. Woodruff, Chicago, Ill. App. filed March 4, 1912. Operates by attraction between magnet on car and magnetic elements on track.

1,126,620. ELECTRIC REGULATION; J. L. Creveling, New York, N. Y. App. filed Jan. 30, 1911. Charging storage batteries.

1,126,623. ALTERNATING-CURRENT BLOCK SIGNAL SYSTEM; C. D. Ehret, Ardmore, Pa. App. filed Feb. 11, 1905. Employing commutatorless motors.

1,126,627. PROCESS FOR ELECTROLYZING ALKALI-CHLORIDE SOLUTION; W. Gaus, Ludwigshafen - on - the - Rhine, Germany. App. filed Nov. 11, 1912. Electrolyte passed through vertical filter diaphraghms from anode to cathode.

1,126,641. METHOD OF ELECTRIC SIGNALING; C. Kinsley, Chicago, Ill. App. filed Feb. 2, 1903. High-speed telegraphy.

1,126,642. SYSTEM OF TELEGRAPHIC COMMUNICATION; C. Kinsley, Chicago, Ill. App. filed Nov. 26, 1907. Combines mechanical printing telegraph with chemical recorder.

1,126,655. METHOD OF UNITING SHEETS OF BRASS, ALUMINUM AND OTHER METALS OF HIGH CONDUCTIVITY FOR HEAT; N. Prostler, Berlin, Germany. App. filed Nov. 11, 1912. Melts or fuses the metals together under an electrode pressure of about 66 lb.

1,126,665. METHOD OF CHARGING STORAGE BATTERIES; D. H. Wilson, Ridgewood, N. J. App. filed July 17, 1912. Reduces the charging time of batteries having low-resistance leading-in wires in their plates.

1,126,666. METHOD OF CHARGING STORAGE BATTERIES; D. H. Wilson, Meadville, Pa. App. filed April 24, 1911. Heavy current during charging avoids "forming" action and consequent deterioration.

1,126,667. METHOD OF CHARGING STORAGE BATTERIES; D. H. Wilson, Meadville, Pa. App. filed May 6, 1911. Heavy charging current.

1,126,668. APPARATUS FOR CHARGING STORAGE BATTERIES; D. H. Wilson, Ridgewood, N. J. App. filed Nov. 21, 1911. Time-controlled means to step current from generator down from higher to lower amounts.

1,126,669. APPARATUS FOR CHARGING STORAGE BATTERIES; D. H. Wilson, Ridgewood, N. J. App. filed Nov. 21, 1911. Automatic resistance device.

1,126,670. APPARATUS FOR CHARGING STORAGE BATTERIES; D. H. Wilson, Ridgewood, N. J. App. filed Nov. 21, 1911. Time-controlled means for progressively charging the battery.

1,126,671. STORAGE BATTERY; D. H. Wilson, Ridgewood, N. J. App. filed Nov. 21, 1911. Rigid construction and capable of being charged by abnormally heavy charging current.

1,126,672. ELECTRIC-LAMP FIXTURE; G. J. Dormandy, Troy, N. Y. App. filed June 25, 1914. For table or desk; has adjustable lamp-carrying arms.

1,126,676. IGNITION DYNAMO; C. T. Mason, Sumter, S. C. App. filed July 26, 1913. Of simplified construction.